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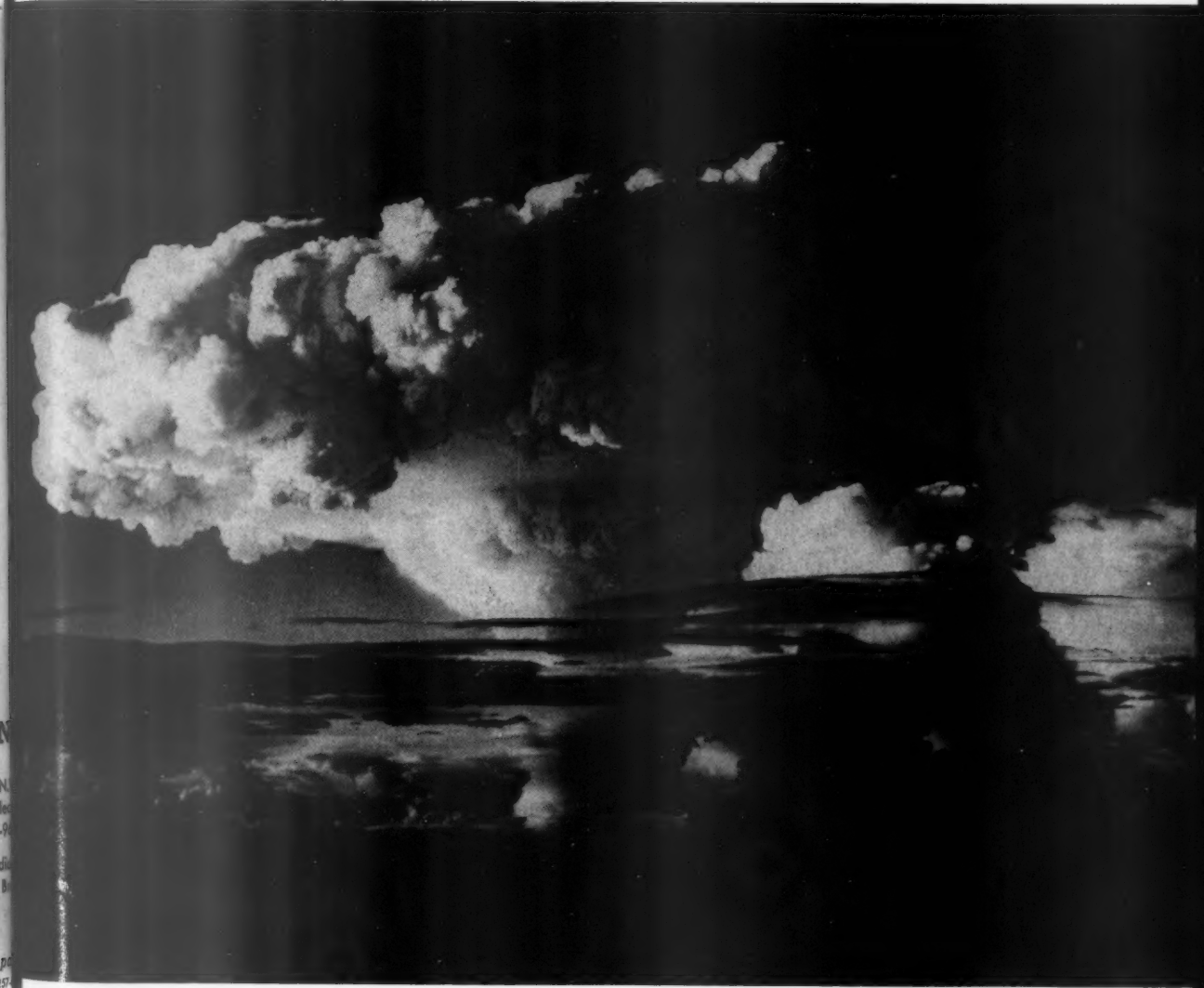

Todays Military Strategy: Is It National Suicide? .. p. 13

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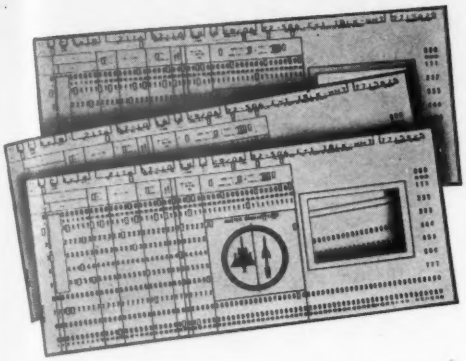

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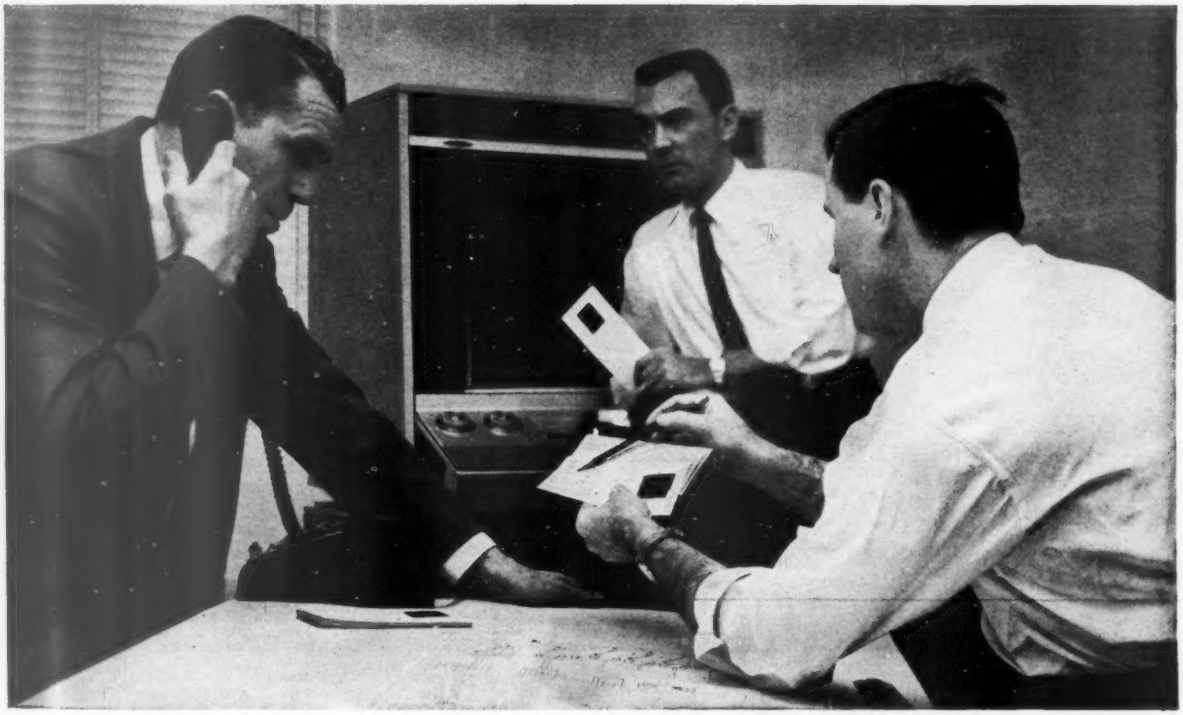

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ARMED FORCES management

PUBLISHED FOR THE ARMY, NAVY, AIR FORCE, COAST GUARD AND MARINE CORPS

MARCH, 1960

Volume 6—No. 6

FEATURES

Today's Military Strategy: Is It National Suicide? 13

With all of the heated debating about the missile gap, or the lack of one, it is well worth taking a long look at the very basic idea of massive retaliation, on which most missile production is based. Is this idea valid in today's world, and will it be in tomorrow's? This has become a point of serious speculation in many parts of the Pentagon, and the reasoning is set forth here.

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FEATURED NEXT MONTH

Industrial Security: What are We Trying to Protect? . . . A Team Approach to Pricing . . . A New Way to Build Executive Leadership

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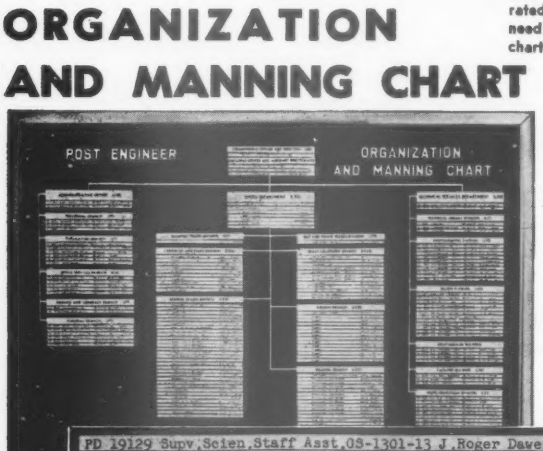

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In My Opinion

Decide—Then Do It

I read your article on the Bureau of Naval Weapons in the Jan. 1960 issue of ARMED FORCES MANAGEMENT with much interest. I felt it was an excellent representation of the analysis of the philosophy behind the Bureau organization. Needless to say, it is not an easy organization to explain but I still am convinced that it was a highly effective step forward in our Bureau system.

I particularly want to thank you for the plugs. Probably if we learned anything about organization, it could be expressed best as: "If you must reorganize, make up your mind as to what you are trying to do and then do it as rapidly as possible." In a planned organization, the more it is chewed, discussed and beaten over, the more certain it is that dissident groups will develop. I am firmly convinced that in the rapid work my excellent, small staff did, they contributed materially to the organization of the Bureau.

RAdm. Charles B. Martell
Assistant Chief of Naval
Operations (Development)

Omission Cited

In the January issue of your magazine, your article on the Bureau of Naval Weapons does a grave injustice to a highly select and efficient group of naval officers and civil servants. I refer to your "organizational picture" of the Bureau which omits the Meteorological and Photographic Management Officers from the Fleet Readiness Group structure.

Inasmuch as the functions performed by the two divisions under the direction of these officers are essential to successful fleet operations, they form a very vital though relatively small part of the Bureau of Naval Weapons.

It would be greatly appreciated if this oversight could be corrected in some future issue.

Capt. S. W. Betts
Meteorological Management Officer
Bureau of Naval Weapons

Editorial Challenged

Your editorial in the December, 1959 issue of ARMED FORCES MANAGEMENT is of questionable merit. It surely reflects only your own thinking . . .

Cooperation between the Congress and the Department of Defense is most vital. Calling members of Congress, or their staffs "rock-head elements," or "bubble brains," or suggesting that

(Continued on page 54)

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How About Those Manuals?

NEARLY everybody in sight has managed, in the past few weeks, to shove his oar in the water over Air Force manual 45–0050. Authored by Homer Hyde, an 18-year veteran of manual writing at Lackland Air Force Base, Tex., this training book for reserves "points out," as part of a course in information security, that (1) communists have infiltrated some parts of the nation's religious organization; and (2) that the public's right to know is not an unquestionable privilege where military operations are concerned.

With a handful of exceptions, critics have roundly blasted the Air Force for purveying such contentions, ranked 45–0050 with SAC's "Big Brother" manual and that ridiculous booklet on "How to Wash an Officer's Dog." Spearheading the attack: the National Council of Churches and that admirably named but atrociously led House Sub-committee on Freedom of Information.

Probably the strangest aspect of this whole carnival has been that the manual's controversial statements have been assumed, from the outset, to be wrong. Hyde's comments about public right to know, if read in the manual's full context, are absolutely within the Defense Department's prerogative, whether the war is hot or cold. That Defense itself frequently does a botchy job of interpreting it—usually at the expense of the American people—is another story. But we have lived with the basic philosophy since the French and Indian Wars.

If we believe the statements of such as J. Edgar Hoover of the Federal Bureau of Investigation, Hyde's church-communism charge could easily be true as well. However, and this is the crux of the matter, it *is* just a charge and nothing more. Sources for the contention are as likely to be biased as have been the critics in their counter-attack.

Classroom instruction should be based on fact, not argumentative belief. When Air Force Secretary Dudley Sharp first got wind of the N.C. of C. unhappiness, a well-documented brief backing up the manual would have been an invaluable tool. This whole hassle would have taken an entirely different tack. But he didn't have, and neither did anyone else in the Pentagon.

Thus, until, and even for a few days after, this mess was "leaked" to the press, the Pentagon hierarchy chose to sit on its hands, hoping in infantile vain that some fresh wind would blow the whole nasty aroma away before it became too unbearable.

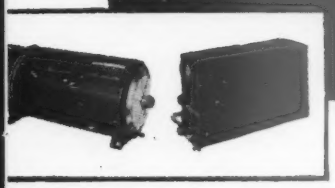
The point: there is no well-policed system for the control of what goes into these manuals. There is something decidedly wrong with a system when Defense or any part thereof has no way to cure what is clearly not in its own best interest—except with scatter-shot reaction to newspaper headline or the threat of Congressional inquiry.

Demanding a higher standard of performance and more attention to sentence structure would obviate what is likely to happen—the establishment of a monolithic superstructure or miasma of *ad hoc* committees which will only further confuse and complicate an already untenable situation.

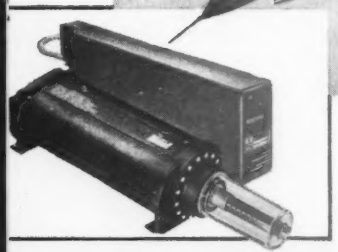
In any event, the Services are going to need a couple months to straighten out this muddle, and set up some sort of operation which has a fair chance of seeing that it doesn't happen again. The possibility of an orderly cure can only be impaired, at this point, by the handful of investigations several Congressional committees have promised.

However, this Pentagon request for a little time is unlikely to appease the nitwits and scalp hunters braying for a little blood letting. Nor is this appeal likely to hold off Washington politicians hot on the scent of a headline. In this Capitol of the barbaric word battle, it is one of the axioms of survival that when your heel is crunched in somebody's neck, you don't let him up, even to straighten him out.

Bill Borklund



The Univac Automatic Antenna Coupler (Series 3200) has been installed in the Boeing 707 aircraft for all major airlines, the USAF KC-135 and the President's airplane, the VC-137. Both of the units shown on this page were developed by the staff which produced the first high altitude antenna coupler.



Originally developed for the Hughes AN/URC air-to-ground communication system, the Univac Automatic Antenna Coupler (Series 3300), has been adopted by Hughes Aircraft Co. for Convair's B-58 "Hustler".

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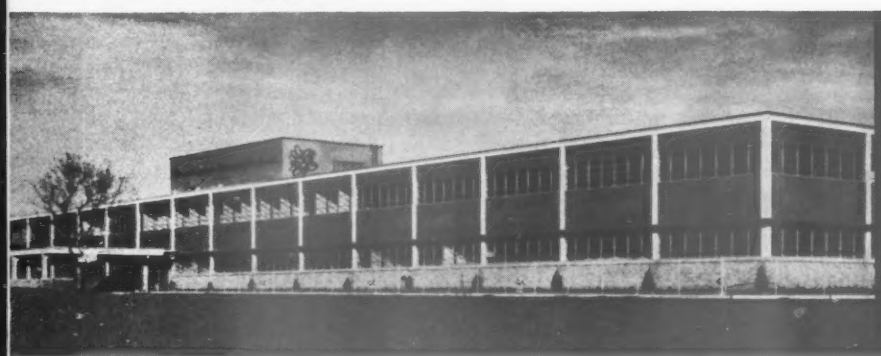

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Washington Background

SOUL SEARCHING TESTIMONY by high level Defense officials on Capitol Hill has left many Washington observers (and a considerable number of Congressmen) whirling in confused circles. How much of what is enough when and where—and can we afford it—has been the theme of hot congressional hearings all month.

PENTAGON CONCERN IS NOT WITH TODAY but with the predictable Defense posture five years from now. For the first time since World War II, say the experts, we have no leapfrogging developments (like first the A-bomb, then the SAC bomber force) even on the drawing board, at least not for publication.

THUS THE COOKS ARGUE INSTEAD over the proper ingredients for the weapons mix—but the mix, they all invariably complain, ends up being more a compromise with no one getting enough of anything. Squirming in this unrewarding environment is leading many of the planners to questioning strongly even our basic military strategy. (See "National Suicide" in this issue.)

ADDED TO THE BASIC HEADACHE—critical because today's decisions will determine where we stand five years from now—is the hot sauce of political vote hunting this year. Far from helping any, it only throws up a confusing fog for honest men trying to weigh the relative merits of weapons.

TYPICAL: THE RETORT THROWN AT ARLEIGH BURKE by Presidential aspirant Stu Symington one day last month when he said in effect, "I've been a strong backer of Polaris. How can I continue to do so if you won't support the B-70?" That back-scratching statement made even Air Force voters shudder.

SPEAKING OF POLARIS, conservative thinking threatens to water down the full benefits of the one bright ray on an otherwise dark horizon. Strangely, reason for the foot dragging is reportedly, "Polaris is not yet out of the woods technically."

SNORTS ONE POLARIS ENGINEER, "That means they want it wrapped with a bright ribbon. Delivery in the packing case isn't good enough. We've already solved all the basic problems. Do they really believe there are any problems we'll hit in the next three years as tough as the ones we've already solved in the last three?"

OPERATIONAL AT YEAR-END, POLARIS has cost $2.74 billion since it was launched in 1956. Ideally, Navy would like to see nine Fleet Ballistic Missile submarines planned for '61, 12 more scheduled for '62.

DEFENSE SECRETARY GATES may decide this month to stump for three more than the three now in the Defense budget. Whether or not he does, Congress seems inclined to vote with the Polaris engineers—at least part way, put 6 Polaris submarines in the budget, take the money out of military assistance.

AIR FORCE INTRAMURAL SQUABBLE over weapon system management techniques is still boiling. Committee from ARDC and AMC, meeting at Langley Field this month, hopes to have some recommendations for the Air Staff. Prediction: some integrated form of a weapon system command.

PART OF THE REASON FOR THE DELAY of the committee in coming up with recommendations to throw at the Air Staff: the difficulty in determining how to cut up the pie. For instance, ARDC reportedly wants to be a bigger factor in the contracting operation, traditionally an AMC chore. At the moment, it appears there will be a number of split papers (rather than unanimous recommendations) which will require Air Staff resolution. This could mean a far tougher time switching to a new setup, no matter what it is.

MATS POLICIES OUTLINED

Greater reliance on commercial airlines for routine operations, and in improved "hard core" Military Air Transport fleet will be two of the guiding factors in MATS' future, according to recently approved courses of action for that command.

These guidelines are set down as the result of a report—The Role of Military Air Transport Service in Peace and War—recently released by the Office of the Assistant Defense Secretary for S & L. The report also called for joint military/industry cooperation in developing a "long-range, economical turbine-powered aircraft" that the report considered "essential" to MATS modernization and long-range evolution of a modern civil cargo fleet.

The report called for re-examination of the Civil Reserve Air Fleet with an eye to optimum effectiveness and responsiveness under all conditions. In the past only shaky provisions have existed for limited war actions by CRAF.

The report recommended that MATS gradually get out of routine cargo business, turning as much as possible over to civil carriers. This would allow MATS to plan its requirements on a "sortie" basis, enabling it to plan only for its D-Day needs.

The report pointed out that MATS, although quantitatively adequate to meet all requirements, has many qualitative deficiencies in its military airlift capability which can be overcome only through modernization. Such modernization, the report said, would improve airlift effectiveness and reduced operating costs for the MATS portion of total required airlift.

Also criticized was the lack of provision for partial mobilization on the part of the Civil Reserve Air Fleet. The report pointed out that "there is not sufficient commercial cargo capability to accommodate military wartime traffic which could otherwise move in commercial aircraft." Because of this, the report said that continuity of overseas pipelines cannot be assured in emergencies, because of other D-Day commitments.

The report also stated that of the 1,245 aircraft assigned to MATS, only 511 are in the common user or strategic airlift fleet. The remainder are not even transports, but converted bombers, fighters, amphibians and similar planes required in the mission of MATS' technical services.

COMMUNICATIONS PLAN ORDERED

A Defense Department-wide communications system that will provide all point-to-point requirements of JCS, Unified and Specified Commands, and the Military Departments will be the result of a plan ordered by Secretary of Defense last month.

The plan also provides for a communications agency within defense to manage and operate this system. Such an agency would begin operations on a phase basis, without disrupting essential communications during transition.

The action by the Secretary of Defense counters an Army proposal that it be made Single Manager for all defense communications. Extremely heavy opposition had greeted the Army plan when it was unofficially announced. (See Jan. AFM).

The Secretary's committee will be chaired by a representative of Assistant Secretary of Defense (Supply & Logistics). Represented on the group will be the Director of Defense Research and Engineering, Joint Chiefs of Staff and the three services.

In announcing his order, the Defense Secretary indicated that the complexity of Advanced Weapon Systems—particularly missiles—have dictated such an arrangement for communications. First to be included under this system will be such "long-haul" communications as the Air Materiel Command world-wide net.

Tactical communications, such as the Strategic Air Command at work will not be included under this system.

DOD says the system is intended to provide facilities for command and control functions, intelligence, weather, logistics and administration, besides ship-to-shore, ground-air-ground and certain weapon systems requirements.

DOD CONTRACTING SCORED

Sen. John Sparkman (D-Ala.) has said it is "unbelievable" that only 100 firms should account for 73.8% of the procurement dollars contracted by the Defense Department.

Sparkman, and Chrm. Paul Douglas (D-Ill.) of the Special Senate Defense Procurement subcommittee, expressed further concern over figures that indicate large firms to be getting about 97% of defense R&D work. Sparkman urged that the government be required to spread these contracts over a larger number of firms, chiefly the smaller research companies.

Comptroller General Joseph Campbell told the subcommittee that there is need to obtain more competition in defense contracting. He said intensive and continuing training to improve skills of contract administrators is also needed to get efficient and economical procurement.

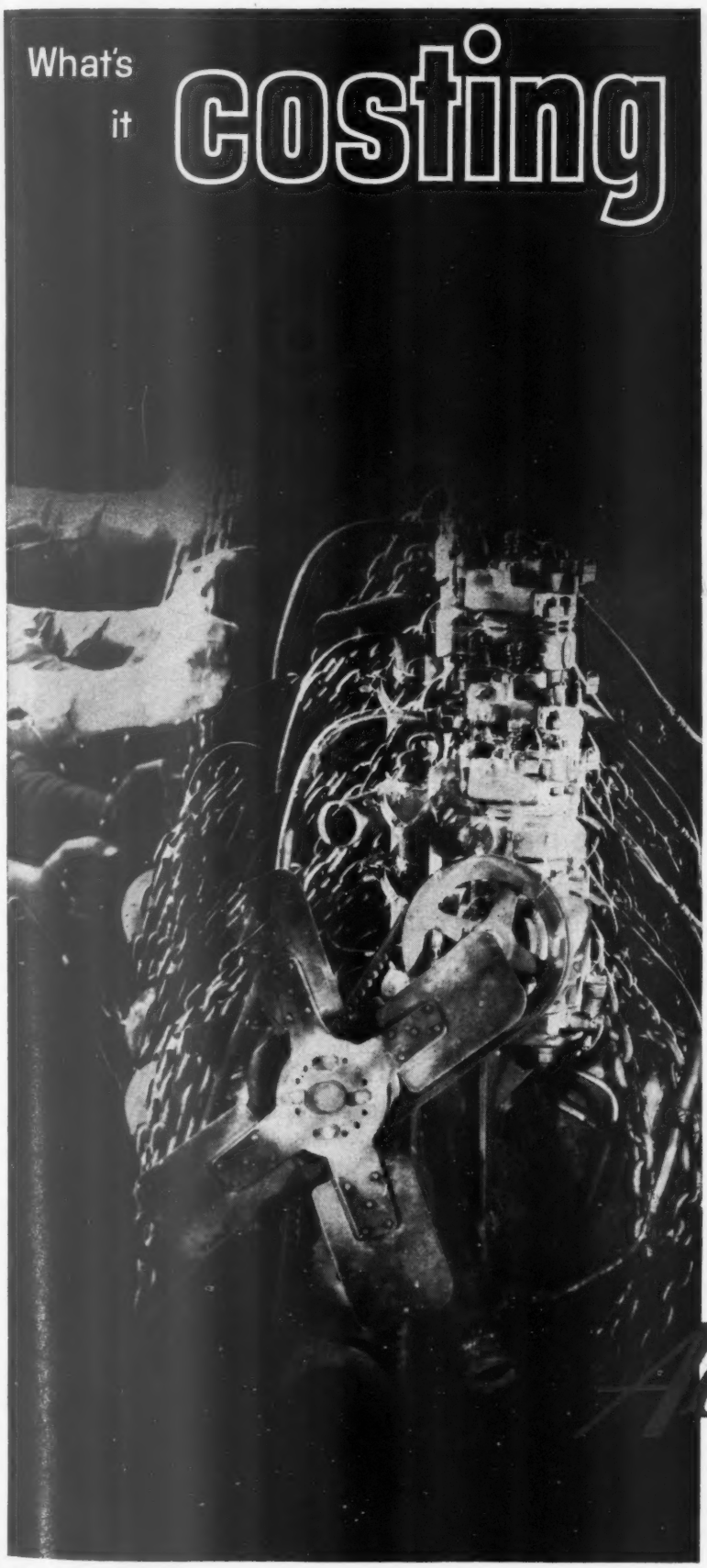
Campbell also scored DOD for failing to develop effective procedures for re-distributing items in excess or in long supply. This lack, he said, permits simultaneous procurement and disposal of the same item by two or more of the services.

SINGLE STAFF CHIEF URGED

A powerful single Chief of Staff for all services would be the result of a bill recently introduced to the Senate by Sen. Stuart Symington. The bill would also aim at an organization in DOD with clearer lines of authority and responsibility.

Another basic aim would be to minimize inter-service quarrels. However, the bill would allow each of the services to maintain its separate identity. The single Chief of Staff would replace the chairman of the Joint Chiefs of Staff, who presides over their meetings, but is voteless in disputes.

The Symington bill would also (1) increase shifting of personnel among the services, (2) abolish Service Secretaries, having instead Undersecretaries reporting to the Secretary of Defense, whose power would be increased, and (3) make mandatory a war plan for all three services, around which the budget would be built.



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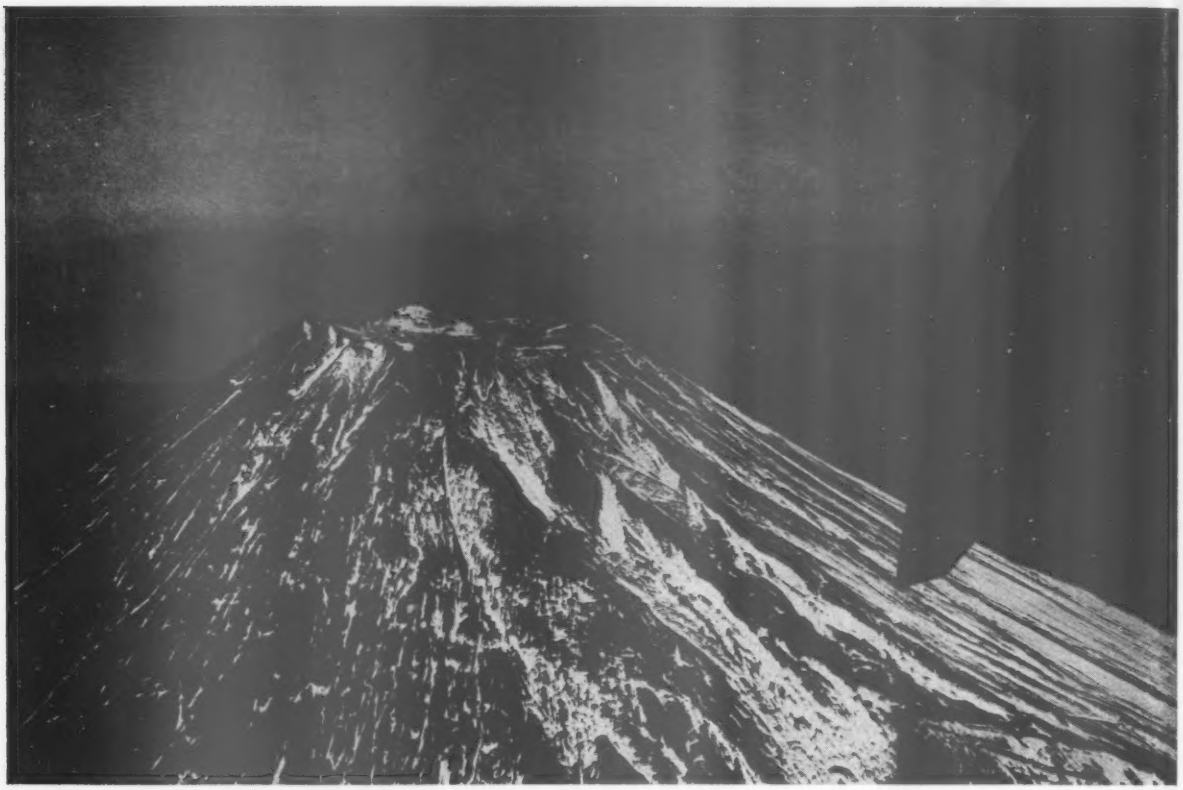

Looking down at Fujiyama with one prop feathered!

EVALUATION TESTS IN JAPAN PROVE AERO COMMANDER'S SINGLE ENGINE CAPABILITIES

The scene is an unretouched photo taken at 15,000 feet of Mt. Fujiyama, (alt. 12,388 ft.) Japan, through the cabin window of an Aero Commander 680E. Right engine dead, prop feathered, the Aero Commander easily circles the peak on one engine. Aboard are six men, full fuel load, complete radio equipment including HF—the 680E is a 7,500 lb. gross weight airplane.

This feat was one of many tests in an evaluation program for the Japanese navy. Routine Aero Commander demonstrations have included similar single engine flights, under full load, *looking down* at Pike's Peak, Mt. Blanc, Matterhorn, Jungfrau, Popocatepetl and many others. Deliberate cross country flights with *one prop removed* have further proved the single engine capabilities of the Aero Commander.

Maximum flight safety is the major factor of the total concept of Aero Commander.

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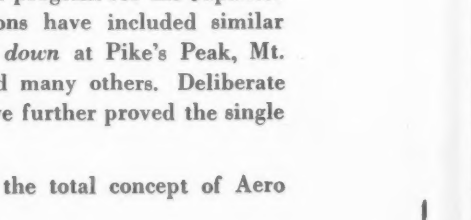

AERO COMMANDER

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Today's Military Strategy:

Is it National Suicide?

• There is a powerful, but admittedly outmanned, element of the Pentagon's strategic planning group growing considerably alarmed over the trend our military strength, or lack of it, is taking.

• Are we building deterrance through massive retaliation? Or have we pointed a cocked pistol at our head and asked the Russians to tell us when to fire?

• Militarily we are stronger than we have ever been before. But decisions made today will determine how strong we are two years from now. And there are frightening indications that we will go primarily with the big missile, which is not the answer. At least in its present and planned forms.

• Altering course will require drastic action now. If we don't, the "Soaring Sixties" will find us boxed into our own dilemma. We will have a choice between cutting our throats or surrendering the free world chunk by chunk.

• This is why . . .

by Bill Borklund

Based on new views emerging in some defense department circles

"IN CUTTING the number of our armed forces we are not decreasing the fire power . . . This is the main point . . . I again emphasize that we already possess as many nuclear weapons, both atomic and hydrogen, and the necessary rockets for delivering these weapons . . . that should any mad man launch an attack . . . we would be able literally to wipe the country or countries . . . off of the face of the earth." These are not the words of Dwight D. Eisenhower introducing the "New Look" in the fall of 1953. They were uttered by Nikita Khrushchev on 14 January 1960.

With these words, Khrushchev placed his seal of approval on the United States' national policy of deterrence through massive retaliation. We have finally succeeded in selling our "new look" to the Soviets.

Although Khrushchev's acceptance of "minimum deterrence" is a tribute to American salesmanship, it unfortunately gives the Communists the keys to Eurasia. Soon Asia will be theirs for the taking. Thereafter, as soon as the utter despair implicit in the mutual suicide of massive retaliation becomes apparent to the citizens of Western nations, we will also be subject to the piecemeal loss of Europe.

During the past five or six years, massive retaliation has been corrupted to mean the wanton destruction of Soviet cities and people. Its goal—the utter devastation of Russia. Its motive—an irrational urge for revenge. Its price—national suicide!

Our present dilemma arises from two commonly accepted positions: 1) our extreme reluctance to base survival of the free world on a classical conventional war of attrition resulted in a national policy of massive retaliation; and 2) the ever-increasing cost of modern sophisticated weapon systems makes the cheapest form of national defense extremely attractive.

In his historic address before the Council of Foreign Relations on January 12, 1954, Secretary of State Dulles declared: "The way to deter aggression is for the free community to be willing and able to respond vigorously at places and with means of its own choosing."

The concept of massive retaliation has not one but several meanings. The Eisenhower administration took great pains to define each of these during the debate after Dulles' speech.

The first and most general meaning, which applies to all types of military aggression, is, as Dulles said in Chicago later "a capacity to inflict punishing damage." The potential aggressor must be deterred, not merely punished after he has acted (as was the case in Korea). "To apply this deterrent principle, the free world must maintain and be prepared to use effective means to make aggression too costly to be tempting," for the aggressor must know in advance that he would be made "to suffer from his aggression more than he can possibly gain by it . . . that the probable hurt will outbalance the probable gain."

Due to our inferior manpower position and superior nuclear position, it was announced that we would respond to aggression "by means and at places of our own choosing." It must be remembered that at this time, the United States had an overwhelming strategic nuclear capability.

Should we have become engaged at that time in World War III, we could have unquestionably destroyed the opposing military force by applying our abundance of power as carefully, *or as indiscriminately,* as we saw fit. "Massive Retaliation" pointed up the overwhelming nuclear superiority of the democracies but tempered it with the promise that this strength would never be used for aggression.

Six years ago, General Nathan Twining was convinced that: "War may not be prevented by an uneasy and

Scorpions in a bottle . . .

debatable balance, but war may be prevented by a superiority of weapons on the side that wants peace. The fact that the United States for years held a virtual monopoly of superweapons and long-range air power without exploiting that power in war, proves to all the world the sincerity of our defense for peace.

". . . counterattack has been referred to as retaliation. The word is appropriate only in the sense that it defines the counterattack as an action to be taken in response to enemy action.

"The word 'retaliation' is misleading if it is assumed to mean 'revenge'. A desire for revenge may be understandable but from a military standpoint, as well as from a humanitarian standpoint, it should not be allowed to influence our strategic decisions in war.

"In air warfare machines and weapons are overwhelmingly important, for without them there can be no air warfare at all.

"Machines and weapons, not people, are the principle targets to be destroyed . . .

"It would be a moral blunder and military blunder to concentrate our hopes for victory on the piling up of casualties when the opportunity exists to concentrate with great effect on the enemy's weapons . . .

"Any major attack using weapons of modern war, of course, will cause heavy loss of life . . .

"But it makes a great difference whether victory is sought by the depopulation of a nation or by the disarming of a nation."

DESPITE THIS sound, objective reasoning, the idea spread that we could enhance, at minimum cost, the deterrent aspect of massive retaliation, by directing our strategic force against about 150 Russian cities. Thus, "minimum deterrance" came into being.

Conversely, a capability larger than that required to "rip the guts out of Russia" became known as "overkill." The phrase "How dead is dead?" cropped up. It was apparent that if the destruction of Russian cities would deter the Soviets, this could be accomplished with a relatively small, well-protected nuclear force. Under this concept, cataclysmic damage to the USSR became the goal.

Of course, we would also try to destroy as much as possible of the Russian's residual strategic capability but this would be of secondary importance. The logical goal of "minimum deterrence" must be to place our largest, dirtiest bombs on Russian urban areas, the belief being that if the Russians were faced with the loss of a large part of their peoples and urban areas, they would be deterred from military aggression.

It was immediately apparent that if this kill-the-people philosophy was valid from a military point of view, the Soviets must inevitably counter it by producing a nuclear force capable of destroying U.S. citizens and our urban areas. Hence, we began to hear such terms as "nuclear parity," "mutual suicide," "mutual annihilation," and recently "nuclear impasse." Atomic Scientist Robert Oppenheimer in an article in "Foreign Affairs," used the analogy of "two scorpions in a bottle."

President Eisenhower further confirmed to the entire world the probable futility of this situation in a speech to the United Nations in December, 1953, when he said: "To dwell upon the possibility of atomic war and its hideous damage would be to confirm the hopeless finality of the belief that two atomic colossi are doomed malevolently to eye each other indefinitely across a trembling world.

"To stop there would be to accept hopelessly the probability of civilization destroyed, the disappearance of the great artistic, scientific and cultural achievements, and probably condemning mankind to begin all over again the age-old struggle upward from savagery to decency, justice and right."

As recently as January 7, 1960, the President, in his State of the Union message, added:

"First, I point out that for us, annual self-examination is made a definite necessity by the fact that we now live in a divided world of uneasy equilibrium, with our side committed to its own protection and against aggression by the other.

"With both sides of this divided world in possession of unbelievably destructive weapons, mankind approaches a state where mutual annihilation becomes a possibility. No other fact of today's world equals this in importance—it colors everything we say, plan, and do."

From this statement, we can postulate the following:

Should the Russians choose to take Berlin, the U.S. would be faced with the impossible decision of responding with nuclear military force under our national policy of massive retaliation —and thus assure our own "suicide." The alternative: conceding the fall of Berlin and the eventual piecemeal "liberation" of democratic Eurasian nations.

Also, in a small hot war in Laos we could assist with U.S. military forces using conventional weapons. However, our forces could not be decisive if China gave substantial help to the insurgents. Thousands, or even hundreds of thousands of "volunteers" could cross the border from China and North Viet Nam.

We would then be forced to counter this force with large Free World forces. A classical war of attrition would result. The Free World would be fighting a battle with tremendously long lines of communication while the Communists would have very short lines of supply. A Korean-type conflict could result but without our having control of the airspace over the battlefield.

To prevent defeat in situations such as these mentioned, some advocate the use of tactical nuclear weapons. However, our tactical nuclear weapons could be decisive *only* if the Communists did not also use them—and such an assumption is untenable.

Under conditions of mutual massive retaliation, introduction of tactical nuclear weapons by both sides into a small war *which both sides have determined to win*, can only result in denial of the disputed area to both parties by ultimately devastating the land. This course would be unacceptable to the third party which the U.S. was attempting to aid. Only once, if ever, would our assistance be sought under these conditions.

The idea that we would commit "mutual suicide" for a third party is not credible—our successful conclusion of a war half a world away against determined Communist attack is not militarily feasible under "minimum deterrence." The threat of mutual annihilation cannot spring us from this trap.

Thus we have the unhappy situation wherein the "mutual suicide" aspects of mutual massive retaliation serve to protect only the U.S. and Russia proper.

The fallacy of "massive retaliation," "minimum deterrence," "finite deterrence," "overkill," "nuclear parity," "nuclear stalemate," "nuclear impasse," "stable/unstable deterrent," etc., is that *military force is applied primarily against non-military targets.*

The idea that the Free World can hold hostage millions of Communist people through nuclear rockets and bombers and thus deter Communist military aggression is extremely attractive—and entirely in error. A concept of holding cities and people as hostages is about as cheap a method of "deterring" as can be conceived. The cheap-

est deterrence of all today, however, would be the unquestioned capability to destroy all Commuist people. If we are interested in economy, germ warfare is the cheapest way to achieve this end. This would also be the cheapest method for the Communists to use.

In world nuclear war civilian populations are hostage. They can be subjected to biological, chemical and radiological attack by either side. However, in the relatively short decisive phase of a nuclear war they are militarily insignificant. The military planner must not think that genocide is a military solution to armed conflict. It was not the practice in World War II to kill captured civilians, when the front had overtaken them, for the obvious reason that the killing of civilians was a reciprocal capability, a wanton act, morally wrong, and served no military purpose.

ON February 1, 1960, Secretary of Defense Gates reportedly told Congress that even after a surprise Russian attack our remaining strategic forces would be sufficient to obviate "any national decision to attack us . . . they would lose all their cities." It would appear from this that the Secretary of Defense had accepted the paralogical doctrine of "mutual annihilation."

The peace of the past decade has been brought about by superior, initially overwhelming, U.S. strategic offensive capability. To concede, as our national policy of massive retaliation does, that "numbers do not count" is to accept the aberrational military philosophy of employing an inferior military force against non-military targets (population and urban areas) in a wanton campaign of genocide. Massive retaliation demands that Russia believe we are capable of a premeditated and irrational act of national suicide.

Our country, and now Russia, has almost completely lost sight of the immediate objective of *all* military force—to prevail over the opposing military force. Again as General Twining so aptly said "No matter how desperately we may be forced to fight in our own defense and in defense of our allies, we shall hold to this principle: America plans no wanton destruction of people under enemy control, and we have no desire to revenge upon unfortunate populations who live in fear of their Communist masters."

A major redirection of our military thinking is in order. We must endeavor once more to achieve a superiority in strategic offensive capability. This capability must be directed toward destroying opposing military forces—not destroying people.

Perhaps the most common argument against such an objective is "How can we attack his missiles after they have left Russia? His bombers would already be airborne so his airfields would be empty! With his force on its way, there is nothing to attack —except cities." The absurdity of this reasoning is exposed by determining what his U.S. targets would be. They must be our strategic offensive force.

Our problem is now, and will continue to be the protection of our force from surprise attack. With a significant U.S. residual capability guaranteed, Russian attacks against our cities would certainly be an act of suicide for them. The nation which strikes the first blow would not profit from a counter-nation (people and cities) strategy. Its only hope for success is to pit strategic system against strategic system with the bulk of the destruction concentrated against military forces.

With a superior strategic force in hand, Khrushchev could exploit it in this fashion: "The Communist goal is world peace. We have worked hard and had good success with our program. We have many of the good things of life. The Capitalist warmongers say that if war comes they will destroy our country and our people. But they are wrong. We are a peaceful people. If the West brings war upon us we want them to know that we will not attack their people. They are unfortunate dupes of the Capitalist bosses. Our superior forces will attack only the Capitalist force which can hurt us—their long range forces. But, in spite of this, if the West plans a wanton attack against the Russian people, they must know that we will exact at least two American lives for every Russian. They would do well to recognize our superior strength and give up this nonsense of suicide for it would be *their* suicide, not ours!"

The first step toward a credible national defense which can protect our country *and* the free world is to expurgate massive retaliation of its current objective of carnage, genocide, devastation and annihilation.

The only Russian strength which menaces our country is their strategic offensive force and its protecting air defense force. Therefore, our entire attention must be limited to this objective. Success in attacks against strategic offensive and air defense forces renders all other military forces impotent.

When it is once again established that opposing military force is the only objective of the military, the problem becomes solvable once more. When we use proven military rules of war once more, after the lunacy of "mutual annihilation," we can postulate military conflict in somewhat the manner of the following paragraphs.

Nuclear rockets are highly effective against known, well-located, fixed targets. Therefore, there will be an inevitable trend toward mobility in armed forces to counter the ballistic missile threat. The capability to appreciably change the location of a weapon or military force in something less than the time of flight of an ICBM/IRBM tends to neutralize the ballistic missiles' primary attribute.

As an ever-increasing portion of a modern force becomes mobile, including air defense where possible, the requirement for long-range ballistic missiles decreases in rough proportion.

It is apparent that a weapon system is needed which is capable of armed reconnaissance and attacks against mobile, fleeting, and hardened targets. Some day such a system may be based in space. However, for the next decade or more, an air vehicle is much nearer fruition. A B-70, with nuclear power, and equipped with ALBMs or other firepower should do admirably as part of the "mix."

The problem for military planners then becomes one of seeking out and destroying the opposing weapon systems and their ground support. Extreme accuracy is required. Unnecessary destruction is to be avoided since whatever actions are employed against the enemy's civilian population can usually be employed against our own.

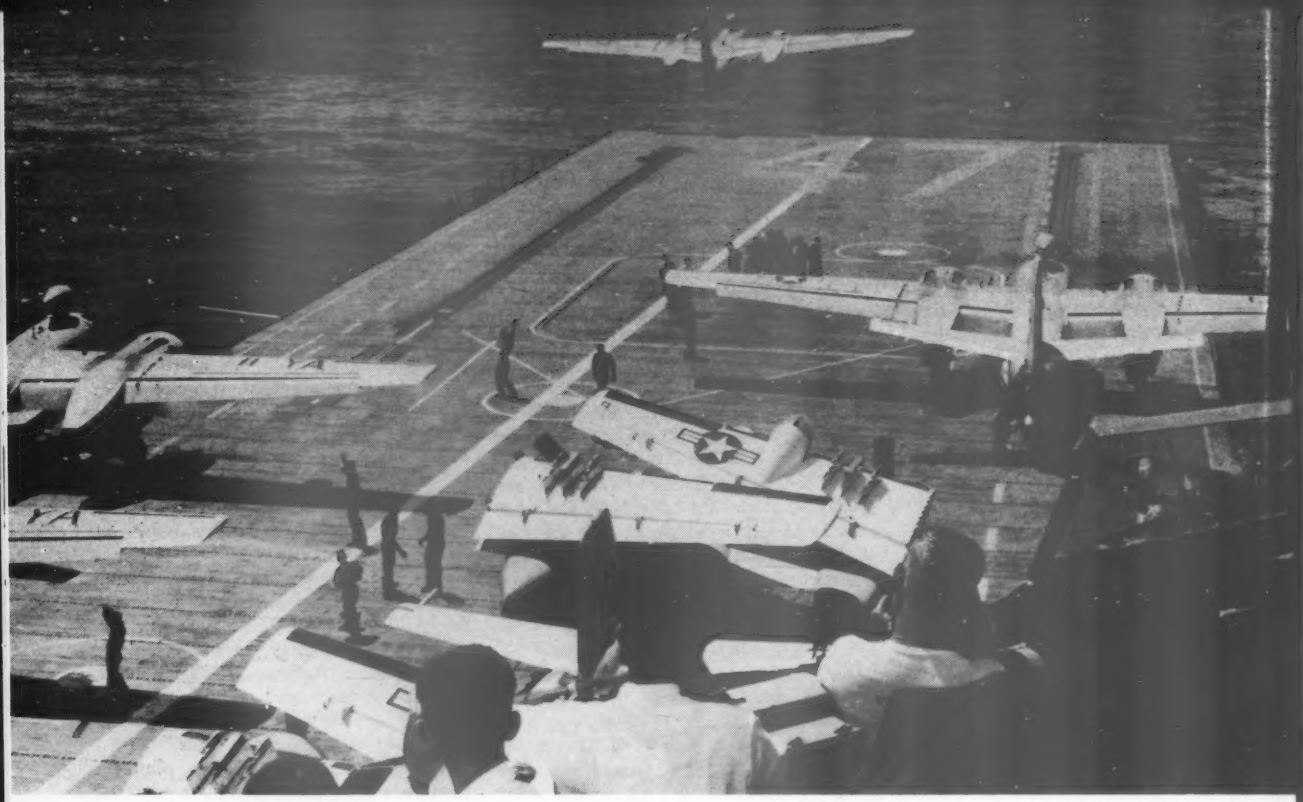
Implicit in a strategic offensive force designed to be used discriminatingly against opposing military forces is the capability to destroy hostage populations. This is our safeguard against indiscriminate attacks.

EVEN DURING the death throes of its military forces a nation cannot employ its waning strength in an act of revenge and thus expect to change the outcome. The issue would have been clearly decided prior to that time. It is difficult to visualize a nation electing to kill its citizenry *when such an act will not bring victory or even stalemate.*

The problem which gives rise to the negative solution of suicide is obviated by creating, prior to war, military forces capable of defeating other military forces. Difficulty in creating weapon systems to accomplish this is not grounds for abandoning the concept.

Deterrence through avowed resort to "mutual suicide" is morally and militarily indefensible.

That we should have temporarily lost sight of this basic military fact is perhaps understandable—but that our aberration should have persisted for eight years is totally inexcusable.



Fast, wide-ranging search operations fall to aircraft

ASW Progress Report:

Tying up the Loose Ends

by Fred Hamlin

"ALL WE NEED to solve our anti-submarine warfare problems is a system that can be installed in an airplane that can fly at 40,000 feet that will spot and identify a submarine at any depth as far as the plane's horizon extends. The same plane would be armed with a weapon that could kill anything it spotted. This, of course, we will never get."

The speaker is RAdm. H. A. Yeager, Navy's Anti-Submarine Warfare Readiness Executive. The problem is perhaps one of the most complex that has faced the Navy in its entire history—from a technological as well as a managerial point of view.

From the top of the Navy—the Secretary of the Navy's newly-formed top-policy ASW committee—down to the individual pilots flying ASW search missions, Navy is bucking what is probably one of the toughest across-the-board coordination problems that any service presently has to contend with.

To combat the problem, Navy has been open to just about anything in the way of suggestions (technical or managerial), has operated in such a frenzy of activity that, to the outsider, it has appeared something like the proverbial headless chicken. Committees on committees, new offices overnight, scrutiny of almost numberless technical proposals—all have been part of a mammoth effort within the Navy to get itself squared away.

Because ASW is unquestionably a Navy-wide problem, perhaps the greatest effort that has been expended to date has been to come up with a unified approach to the problem, at all levels. To do this, Navy has had to set up everything from schools to committees, and even at that, one Captain comments "some of our best coordination work is done in wardrooms. We can only encourage this."

During the past year or so, Navy has made some fairly remarkable progress in tying up its loose ends, doing much to bring together what were previously just splintered segments nibbling at odd corners of ASW.

Because it is the fleet that has to deal with this particular Navy problem on a day-to-day basis, it was in the fleet that the need for a coordinated effort was first felt several years ago. The result was what has now evolved to the various ASW task groups—Alfa, Charlie, Bravo—combining the ASW capabilities of just about everything that the Navy operates in the water—from submarines to surface vessels, and on up to fixed-and-rotary-wing aircraft.

The idea, or course, has proven itself—it is now almost impossible for a non-nuclear submarine to sail undetected through, or under, the 10,000 square-mile area that these task forces cover. Even snorkel-equipped subs must surface before they have gone far enough to cross the area, and even if they haven't been previously detected by under-water search devices,

they are almost certain to be found.

But this is the non-nuclear sub. Comments VAdm. "Whitey" Taylor, Commander of the Anti-Submarine Defense Force in the Atlantic, "The nuclear sub represents to us as much of an advance in sea warfare as did the original submarine." As surely as the non-nuclear sub can be caught, its nuclear counterpart has smooth sailing: our own Nautilus in sea trials made three passes under Task Force Alfa, undetected.

But even to stay abreast of the demands placed by the Russian 450-vessel submarine fleet, Navy found itself faced with a major coordination problem, summed up here by a high-ranking officer with the Anti-Submarine Defense Force: "We had pilots asking destroyers to fly, and destroyer commanders asking S2F pilots to hover in place. There was, in fact, an appalling lack of understanding between the sub, ship and plane segments of our forces. They all had been trained as specialists in their own fields, and fairly obviously, weren't experts in everybody else's."

One answer has yielded one of the best tools that has been developed as far as melding a unified ASW force, and one that has turned up with value far beyond that originally planned. It is the Anti-Submarine Tactical School, set up several years ago, but still growing in its importance.

The goal of the school is to give the men in the fleet a working understanding of what the rest of the fleet is doing—so that instead of asking destroyers to fly, the pilot who has spotted a sub will be able to know what the destroyer he calls will be able to do, and therefore use it to the best advantage regarding the problem at hand.

Says ASW School Commandant Capt. J. L. McNitt, "Our biggest job is coordination of intertype tactics, and believe me, it takes an ungodly amount of training." Classes are run at three different levels: Command, Flag and Operations.

Using lectures, a gaming room and a warfare electronic simulator, the School not only works with intertype tactics, but serves as a valuable forum for new ideas, a dry run workshop for sea trials, and a sort of intellectual library for past successes and failures in various tactical situations. As a measure of the close touch the faculty of the school keeps with the fleet, it is again worth quoting Commandant McNitt: "Of course we don't have to chase subs, but we more or less wear sea boots under our academic gowns. We generally would feel out of touch with the fleet if we didn't get somebody out to sea with the fleet every week or so."

The top level class is run for major unit commanders, generally from Commander level on up to Flag Rank. The next level—and perhaps the most important is for the next echelon of command, ship commanders, aircraft squadron commanders and submarine commanders. Finally, to be sure that the higher groups get the sort of support that they need to do their job, another class category is for junior officers and senior enlisted men—the men who must carry out the decisions of their commanders.

Industrial Students

But besides the training the school handles for Navy personnel, there is one other area in which it is contributing heavily to the overall Navy ASW effort. Periodically, classes are run for the men in industry who must design the equipment the Navy uses. These are representatives of the companies who are working on the hardware end of the ASW problem, and are drawn from the most pertinent levels of organization—research and development officials, top management, and long range planners.

In doing this, the ASW School is doing more of the same thing that it was set up for—trying to make sure that the industry part of the ASW team knows what will be expected of the equipment it designs, what sort of an environment it will have to live in, and what the actual sea-going problems that the ASW forces have to face are. Again quoting Capt. McNitt, "The people industry has sent to us have turned out to be responsive and responsible. We think that we've done a lot of good in this area."

Given the ASW School as a point of contact—one that works both ways—the low, brick building that houses the school has become something of a touch-stone both for the industry representative with an idea that he wants an opinion on, and for the Navy man who has anything in the way of a suggestion for improvement on existing or proposed hardware.

But probably the greatest amount of work as far as industry liaison, is being handled in the Pentagon, under the direction of RAdm. H. A. Yeager, ASW Readiness Executive for CNO Adm. Arleigh Burke. And again it is a matter of coordinating diversified efforts, in and out of the Navy, and throughout the myriad of companies in industry who are working with, or have an idea to help solve, the ASW problem.

Because of the twin-command-line inherent to Navy organization, Adm. Yeager's group is one with its hands full. Says Yeager "The ten of us in this shop probably know more about the total Navy ASW picture than any other group in the Navy of the same size."

And besides keeping both sides of the Navy informed (Bureau and Fleet), this group has to work closely with industry, to make sure that Navy (a) doesn't buy anything it doesn't need, and (b) doesn't overlook anything that can help it to work more successfully with the problem. Comments Yeager: "We're making progress. If we weren't, we'd be better off turning in our suits."

On Fleet coordination: "We find ourselves in a position to get more and more information to the fleet. We're no longer faced with the hiatus that there used to be in this area. Where we formerly would talk to individual groups, we are planning this year to run a complete briefing in Norfolk for just about everybody who is concerned with ASW in the Atlantic. We'll cover our programs, budget projections and objectives through 1963."

For the West Coast, the problem is somewhat different. With two central points of operations at Hawaii and San Diego, it is harder to cover everything in one shot. But, Adm. Yeager points out, RAdm. Thach, who is in Command of the Pacific ASW forces, has recently spent three weeks in Washington finding out the score. "He spent most of the time in my office," adds Yeager.

NSIA and the Navy

With industry, a more complex set of problems has made for a more complex, but just as effective, set of solutions. Giving Navy valuable aid in this part of the problem has been the National Security Industrial Association, a group of industrial firms banded together with an eye for more effective defense production and development.

As it currently stands, NSIA—at Navy's request—has set up a group of eight committees covering various aspects of ASW technology. In their work on these groups, NSIA representatives have managed to travel a collective million miles and put in about 25-million man years in the past year. The groups have been free with information among themselves, in spite of their competitive situations.

Navy has set up corresponding committees covering the same areas of technology, with one extra committee composed of the chairmen of the other seven, and serving as a forum for cross-pollination of ideas.

Building a unified approach . . .

The Navy groups report directly to Adm. Yeager, who serves as the central point for ASW work in the Navy.

Because of the close relationship that has been set up between Navy and Industry, two major areas of industrial headaches have been licked. First, Navy has now made it clear to all concerned what has to be done to go to work for the Navy in this area. Formerly, contracting procedures had been rather vague, and many industrial firms who were interested in doing ASW work were frozen out simply because they didn't know where to begin.

Second, and still in the formative stage, under the Deputy Chief of Naval Operations for Development, there will be a central information point set up by the time this article goes to press. When it is set up, it will provide the industry man with an idea a place to present it, before the Bureau and CNO representatives who are in a position to know just what is needed, while at the same time knowing what Navy is already doing, by way of avoiding duplication of effort.

The presentation meeting can give the industry representative an immediate and authoritative yes or no on his idea. And from the Navy standpoint, the committee is just as valuable. "On one particular idea—basically exactly the same thing, we've had nearly a dozen presentations from different people. And with the people asking for contracts that ranged from $500,000 to $8-million. It helps when you can look them all over in the same place."

For overall, absolute top-level coordination, the Secretary of the Navy has set up his own coordinating committee. Comments Adm. Yeager, "We think it's wonderful." What the committee does: offers a group of men (such as Secretary of the Navy, Chief of Naval Operations, Assistant Secretary for Research) who are at the very top of the organization, the opportunity to give an absolute yes-or-no on just about anything that comes up, and do it without having to check with anybody.

While the minutes of the meetings of the Secretary's committee are necessarily secret, one measure of the sort of the work that is being done is available. On one particular item of hardware (total program: $20-30-million), the Secretary's group was able to draw a hard and needed line between engineering and performance specifications, in favor of the former. This will mean savings that will be considerable, in an area where every dollar counts. With the urgency of ASW work as the measure, it is only logical that there should be a group such as this at the top, in a position to move in a hurry when speed is needed.

Besides the tremendous management problem the ASW situation offers, there are another pair of problems. Says Adm. Yeager, "These are what we call the green ones—sea-water and dollars. We would like to be able to see through the first one, and see more of the second."

Yeager points out that the twin problems of detection and identification will be solved in time, but that it will take a lot of work. "We can't think in terms of 'breakthroughs.' It would take something pretty shocking to make us drop anything we're working on now, and we would have to if we were to have the money to support a new program."

Adm. Yeager points out that given the present state of underwater technology, "we're spending money in the research area about as fast as we logically can." In spite of what is apparently a fairly low level of spending, ASW work has had a helping hand in the past—when it was needed—from Defense Department emergency funds or through Congressional supplemental appropriations. Adds Yeager, "I think the records will show that we've had pretty good luck in getting money when we needed it in the past, and that we've made good use of what we've been given. Of course, we could use more to be sure of better research on promising technical developments."

But this is research. In another area, procurement, things could be a bit better. Good weapons—the Mark 44 torpedo, Drone Anti-Sumbarine Helicopters, ASROC—are well on their way to being available, and when they are ready, Navy will need more money in this area than it's getting to buy enough. Says VAdm. J. T. Hayward, DNCO/Development, "Our real problem is that we just don't have enough bullets in the locker. It's as much a numbers game as anything else. If we had all of the available equipment we wanted in the fleet, we'd be in good shape."

Better equipment, and cheaper equipment are always welcome. Comments one Commander with the Atlantic Anti-Submarine Defense Force, "ASROC is a nice weapon, but every time we fire one, it's like driving a Rolls-Royce off the fantail. One of the nice things about the DASH idea is that if what looks like a sub contact evaporates, we can recall the weapon. It's an expensive business. Even with sonobouys, which are one of our cheapest detection methods, its about the same price as if we'd dropped a color TV set over the side."

Unquestionably, Navy is faced with a complex problem, but just as surely, progress has been made in the past few years. When the Russians launch their first nuclear submarine, Navy will be better prepared for it than they would have been even a year ago, both technically and managerially.

ASW is still the top problem facing the Navy, and unless all of the oceans of the world are going to be turned into a mammoth Loch Ness—full of untrappable monsters—it is going to take all of the resources the Navy can bring to bear. It is no easy problem, and Navy has proposed no easy solution, but progress is being made, and given time, money and continued sensible coordination of effort, it will be a problem that is easier than it would otherwise be to beat.

The varied tools...

Turbine-powered helicopters offer advanced benefits to Navy's ASW operations.

For sub-killing, Weapon Able gives punch, rapid reaction time to Fleet destroyers.

Seacopter could be used to combine advantages of in-water detection, flight speed.

Management Analysis at ASC

Air Materiel Command's Aeronautical Systems Center must keep track of many of the multi-billion dollar programs that go to make up today's Air Force. These are the management tools that let them do the job . . .

Air Materiel Command managers can keep track of their multi-million dollar programs through briefings such as this.

by **Maj. Richard B. Lamar**
Chief, Analysis Division, Aeronautical Systems Center

MANAGING a multi-billion dollar business is not commonplace even in today's economic affluence. But at Wright-Patterson Air Force Base in Ohio, several multi-billion dollar businesses are grouped together under one activity, the Aeronautical Systems Center. As a Center of the Air Materiel Command, the world's biggest business, ASC is responsible for procurement and production of all Air Force airplanes and air breathing missiles. This amounts to about five billion dollars a year.

The over-all responsibility for these programs lies squarely on the shoulders of Maj. Gen. Beverly H. Warren, the Commander of ASC.

General Warren has been in the Air Force for 25 years, nearly twenty of these, assigned to various jobs in Procurement and Production. With this background, what management techniques does General Warren use to control his business?

As he puts it, "I pick the most experienced, most capable persons I can find for my Directors and give them the authority to do their jobs. From then on it is a matter of checking to see how well they do." The job of the Analysis Division is to assist the Commander in "seeing how well they do."

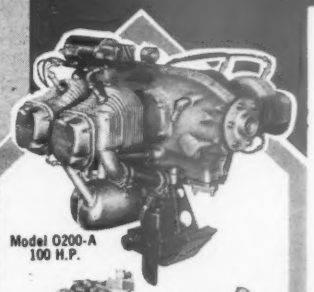
ASC follows the typical pyramid organization pattern with each subordinate echelon responsible to the next higher level, culminating in seven Directors, each responsible for many programs involving several billions of dollars. The Directors meet daily at 0815 with the Commander in an informal staff meeting. The most pressing problems are presented and solutions are discussed, assuring each Director is familiar with over-all problems and the general line of action to be pursued. The pulse of the entire operation is taken at Center Control Meetings which convene at least once a month under the Analysis Division.

Organization of the Analysis Division, like the rest of ASC, is along functional lines designed to accomplish the maximum effort in the most economical method. To reduce administrative overhead and supervisory details that creep in under classical organization, personnel are divided into three work groups with the senior analyst in each designated simply as group leader.

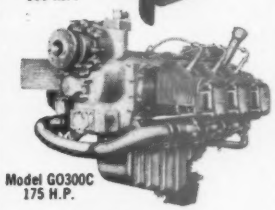
Each group is assigned functional areas of responsibility: Programming-Contracting, Administration and Funds, Weapon Systems and Logistics. Careful selection of personnel with diversified experience assures full coverage in each area. The organization permits considerable flexibility within the Division since it is possible to move personnel between work groups as needed without formal reassignment.

Since part of the mission of the Analysis Division is to provide the ASC Commander and his Directors with decision-making data, personnel quality must be high. The analysts are college graduates, and some have advanced degrees in Industrial Management, Economics, Mathematics or Statistics. This is as it should be for theirs is the task of studying and analyzing information from the Weapons System Project Offices and Equipment Buying Divisions to discover possible problems and make recommendations on necessary further study or remedial action for this, the analyst must know a lot about the operation involved. He must know existing Air Force policies and data flow and reporting systems being used. Existing reports are used in nearly every case. They give an accurate picture of existing conditions, and at the same time eliminate the need for special reports. All analysts must interview operating personnel at all levels.

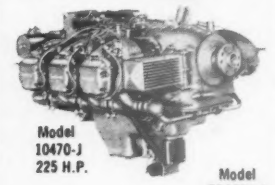
CONTINENTAL AIRCRAFT ENGINES



Model O200-A
100 H.P.

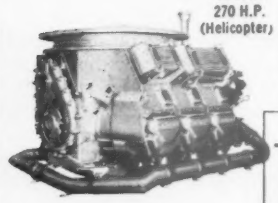


Model GO300C
175 H.P.



Model
10470-J
225 H.P.

Model
FSO526-A
270 H.P.
(Helicopter)



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O200-A	100	2750	4	190	80/87
O300-A B & C	145	2700	6	277	80/87
GO300-C	175	3200	6	312	80/87
O470-15***	213	2600	6	405	80/87
E225	225	2650	6	363	80/87
O470-K & L	230	2600	6	404	80/87
O470-M	240	2600	6	409	91/96
O470-G	240	2600	6	432	91/96
O470-H*	240	2600	6	472	91/96
I0470-C	250	2600	6	432	91/96
I0470-D	260	2625	6	426	100/115
I0470-F	260	2625	6	426	100/130
I0470-J	225	2600	6	402	80/87
I0470-K	225	2600	6	391	100/130
FSO526-A**	270	3200	6	575	91/96
GSO526-A	340	3100	6	549	91/96

*Pusher Type engine with extended propeller shaft
**Helicopter engine ***For Military use

Continental Motors Corporation
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For more facts request No. 103 on reply card.

By proper interviewing it is possible to get information leading to problems that might not otherwise turn up. By carefully studying such information, it is possible to locate problems that need top management attention.

The criterion for determining a potential problem is to compare actual performance against forecast, performance against schedule, cost against estimate, and actual production against previously established goals.

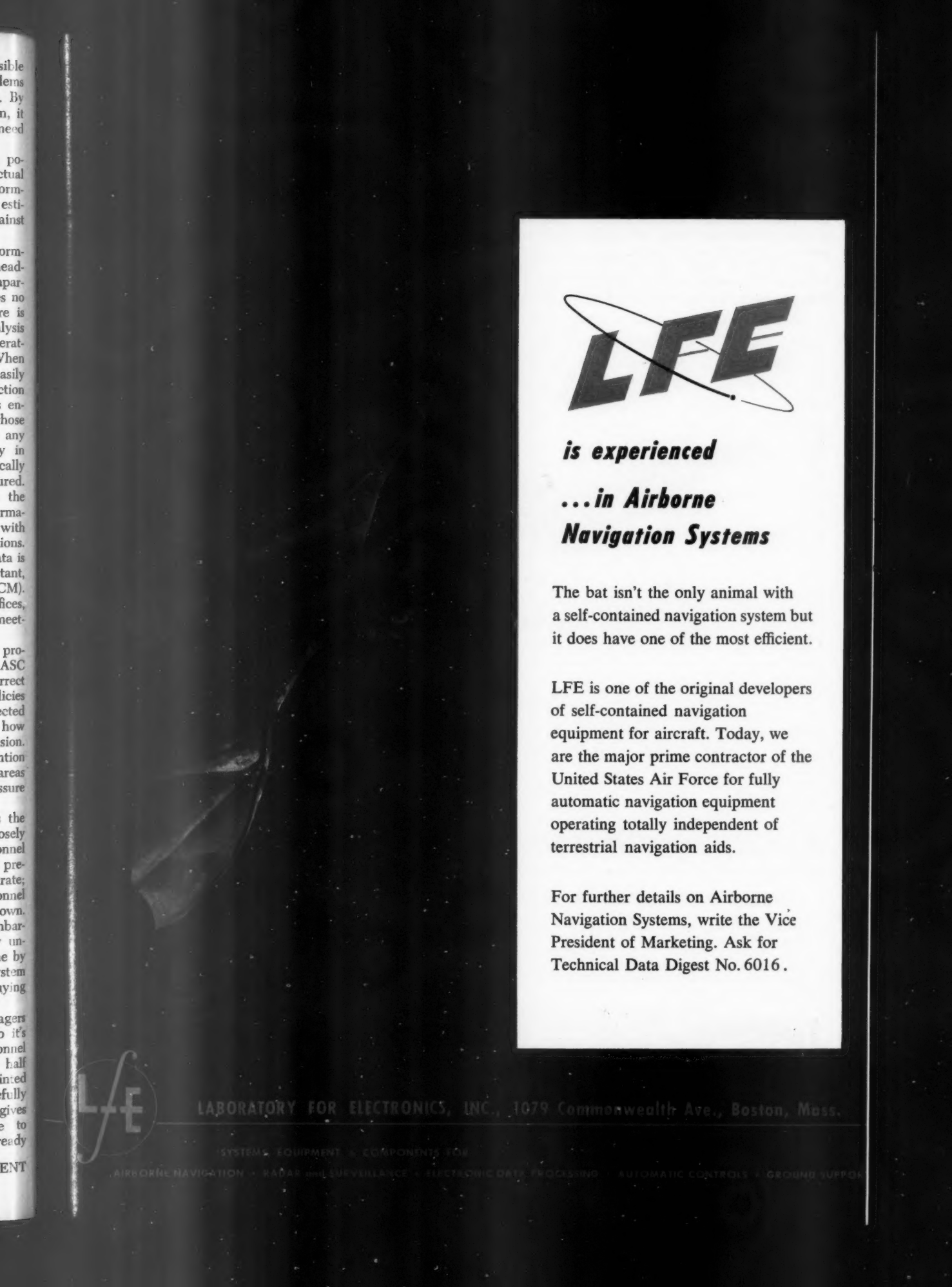
In some cases, standards of performance have been set by higher headquarters or headquarters of comparable level, but in many other cases no prescribed standards exist. If there is no established standard, the Analysis Division, working closely with operating people, set a realistic goal. When performance shows goals can be easily met by most operating divisions, action is taken to reduce the goals, thus encouraging further improvement in those performing the work. This way, any data indicating lack of efficiency in operations are scrutinized periodically and continued improvement is assured.

The job is not complete when the study is done. To be useful, information must be presented to those with responsibility for making the decisions. At ASC there are two ways this data is presented. First, and most important, is by a Center Control Meeting (CCM). All Directors, Chiefs of Staff Offices, and Division Chiefs attend these meetings, held once a month.

These Center Control Meetings provide means for the Commander of ASC to direct specific actions to correct problem areas; to discuss AF policies with his top managers and selected Staff, and to determine quickly how well he is accomplishing his mission. The meetings also focus the attention of the entire Center on those areas considered most important and assure that progress is made.

The Analysis Division develops the subjects to be presented. This is closely coordinated with operating personnel for two reasons: first, so that data presented will be completely accurate; and second, so that operating personnel will know just what is to be shown. The aim is not to surprise or embarrass anyone. This is a completely unbiased look at the work being done by the activity, be it a Weapons System Project Office or Equipment Buying Division.

If it doesn't look good, the managers will want to know the details, so it's important for the operating personnel to know the agenda. Two and a half days before the meeting a printed agenda is distributed that carefully portrays data to be shown. This gives those attending another chance to study problem areas and to be ready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to answer or ask detailed questions in any of the areas to be discussed.

Meanwhile, data has been reduced to graph form and placed on transparent slides. Normally, meetings consist of 12 to 14 subjects and require about 60 slides. A meeting lasts about an hour to an hour and a half. General Warren or his Deputy, Colonel M. D. Wilson, conduct the meeting. Chief of the Analysis Division and his Deputy provide commentary with each slide, pointing out problems or danger areas.

It is well to point out that in a business as diversified and as large as this, one must rely on management by exception. Emphasis is given only to those areas where performance is not up to par. However, recognition is frequently given to jobs exceptionally well handled since the successful method may benefit others. When information shows trouble or the possibility of trouble, the Director or the Division Chief explains his position in some detail. The explanation usually tells why the Division is in this position, what the Chief has done about it, when he will be back on schedule, and what he has done to prevent recurrence.

To wrap up the full cycle, minutes are taken of the entire meeting. Actions directed by the Commander and specific guidance given to a particular problem area are extracted, published, and sent to responsible activities within three days. Before the next meeting, Directors take the actions directed and provide reports to the Commander. At the start of the next meeting, action items from the previous meeting are discussed.

Flexibility is the keynote in preparing for these meetings. In some cases data will be received at the last minute that will substantially change the picture or represent a much later position than was shown in the information an hand. This guarantees that the latest available information is being shown.

The second method of presenting data is through the *Management Data Evaluation System*. Published once a month, this book is a compilation of statistical data showing performance of the various ASC activities in comparable areas. No attempt is made to rate or score performance, but it is not hard to see who is low man on the totem pole in every area shown. Breakdown by activity is usually carried to a lower level than at the monthly Control Meeting.

Wide distribution aims to give as many as possible an insight into how each Branch or Section compares with other units doing the same sort of work. Again, data is usually taken from existing reports sent to higher headquarters.

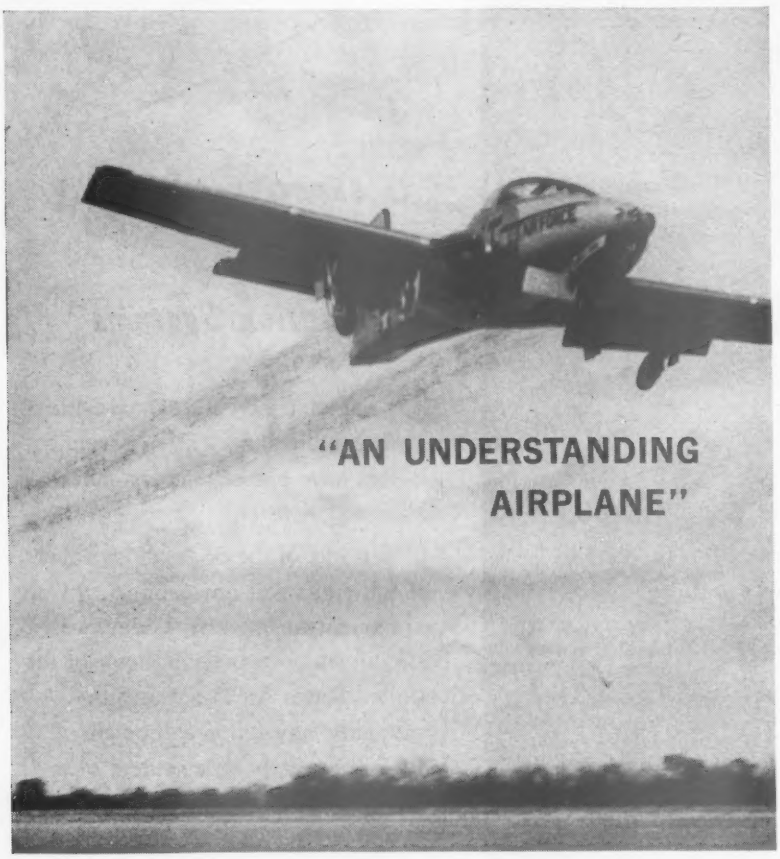
Frequently a section of this book describes in detail some type of action reflecting unusual success. By detailing the action, other groups in similar activities may be able to use the method to improve their own operation.

The complexity and size of these many businesses are such that it is impossible for managers to keep in close touch with each detail. Yet the managers must make important decisions and recommend other decisions to the Commander.

They are also responsible for providing necessary guidance to allow the business to proceed in an orderly and economical manner. As in any business, the manager must rely upon his staff to accomplish the minor details, and in turn, the staff must depend upon those working for them right on down to the lowest organizational level.

If management and control are to be effective, then the mass of detail available must be reduced to manageable form and presented to management in such a manner that knowledgeable decisions can be made. Attention must be drawn to problem areas either existent or potential.

Management Analysis does this for the top managers at ASC.

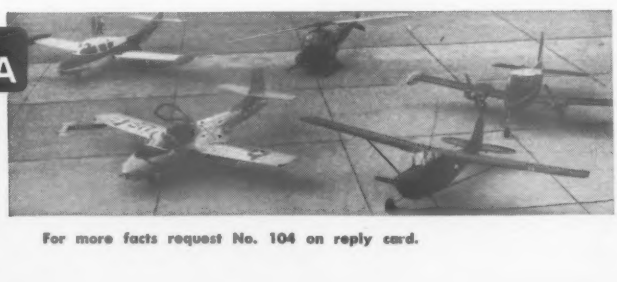


STUDENT PILOT LEARNS A LESSON—THE EASY WAY

His approach low, an Air Force cadet hits the throttle. Suddenly—*instantly*—he's nose-up, hurtling skyward again for another try. Key to the instant power: Cessna T-37's thrust attenuators, "confidence builders" that permit thrust reduction while engines race on, restore engine thrust at a touch of the throttle. Good reason—one of many—why the Air Force has selected the T-37 as its standard intermediate jet trainer.

CESSNA

Military Division, Wichita, Kansas



For more facts request No. 104 on reply card.

The MEDAL Program...

What Microfilming Will Mean In A $2-billion Year Business

ARMED FORCES Supply Support Center efforts to standardize the handling and use of engineering drawings could well, from an economy standpoint, rank as one of their major contributions to the improved efficiency of defense operations during 1959-60. Air Force has been tagged project team leader in pushing the standardization concepts from plan into practice. Air Materiel Command has the equipment to handle the effort, is ready to go, is awaiting only the fruits of the September (tagged a "microfilm must" clause by observers) directive added to all new contracts. Until they received a sufficient number of punched cards with microfilm inserts, they will have no real indication of how well their plan is going to work in practice. At the moment, their major problem is briefing contractors on the importance of the new setup and how it will work. Here is what they have in mind . . . . .

By Paul R. Durr, Chief of Data Logistics Section and Program Monitor Edward L. Todd
Supply Directorate, Headquarters/Air Materiel Command

BARELY noticed in all the fuss and furor over budgets and such has been the defense effort to standardize engineering data preparation and distribution, first announced at the tail end of 1959.

Apparently a dry subject, this standardization effort in reality amounts to something like changing the textbook in the middle of the course on how to build military hardware, gains real significance (even for people only casually interested in engineering) when the probable money savings are discussed—up to 80% of present costs in some aspects of a $2-billion-a-year item.

Major defense goal is for all government services to use substantially the same data and the same systems. Two major categories of engineering data (drawing preparation policies and procedures; and distribution policies and procedures) have already been or are being re-oriented. In one, Mil-D-70327 has replaced some 40 military specifications. On the distribution problem, a second specification now being drawn up will cover standard 35-mm microfilm mounting of data in punched cards for distribution throughout military departments and contractors. Ultimately, a handful of documents on the whole process of data handling will replace some 158 separate service directives on the same subject—a considerable improvement in communication and efficiency all by itself.

Air Force has been pegged team leader in the standardization effort, has assigned responsibility in its own operation to the AMC Supply Directorate at Wright Patterson Air Force Base.

Once the program hits full speed at AMC, key result will be a drop in the cost of weapons procurement, essentially by getting the prime contractor out of the paperwork business.

Under old Air Force contracts, the weapon system manufacturer supplied not only the weapon but a set of engineering drawing reproducibles, numerous sets of non-reproducible prints to the Air Force and its field activities.

On a major weapon system, actual output of engineering drawing reproducibles and non-reproducible prints for Air Force distribution was often greater than the total annual engineering drawing reproduction effort of many large firms—and Air Force paid a bucketful for this administrative function—current estimate: $1.5 billion a year for the drawings, plus $500,000 for reproduction.

Frequently, the manufacturer accumulated up to 50,000 drawings on a major weapon system, had to furnish these plus close to a million non-reproducible prints to the Air Force. Storage is another headache: with drawings averaging six square feet in size, a major weapon system might need up to 5.4 million square feet of storage space for print paper, and another 300,000 square feet to file away the expensive reproducibles.

Under the new contracts now being issued, the prime contractor furnishes the Air Force five things:

1—One set of 35 mm microfilm

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2—One microfilm index

3—One punched card for each drawing in a complete set of data for an item.

4—One punched card for each frame of microfilm.

5—One punched card for each vendor item used in end assembly.

With these five items, Air Force expects one dollar spent on microfilm and punched cards will do the same job as $5 spent on reproducibles and prints. What is more, instead of the manufacturer being in the business of distributing Air Force paper work, he will supply a master record from which Air Force will make its own controlled distribution.

This changeover has been tagged, in Air Force at AMC, by a tongue-twisting mouthful called the Micro-Mechanized Engineering Data for Automated Logistics (MEDAL) Program.

Among the logistical advantages: Engineering drawing distribution is two to three times faster from microfilm and punch cards than from full-sized reproducibles; one cargo plane can carry seventy times as many aperture cards as full-size reproducibles, yet weight is cut 75%.

The Many Economies

What is more, punch card techniques will help eliminate clerical operations; the in-line combination of punch card accounting machines, film printers and film mounters requires far less time than present operations; and our finished product, the aperture card, transforms four different cut-sheet drawings and roll drawings to one standard size. Further, there will be a standard medium of engineering data communications that can be interchanged within the military services and between the military and industry.

Among the other economies; simple systems operations can be performed to achieve such things as mechanical sorting and selecting of complete and partial sets of data—as well as tabulated listings for packing slips. By projecting microfilm on screens for conference viewing, data can be furnished simultaneously to groups instead of having drawings reviewed by one person at a time.

Also, with mechanical operations and punched cards, an efficient and economical records retirement program can be run, weeding out obsolete drawings. (Air Force estimates that one engineering drawing out of every eight in the files should be discarded.)

AMC's program for miniaturized reproducibles is probably the largest aperture card program yet to be tried anywhere. Air Force stores some 7.5

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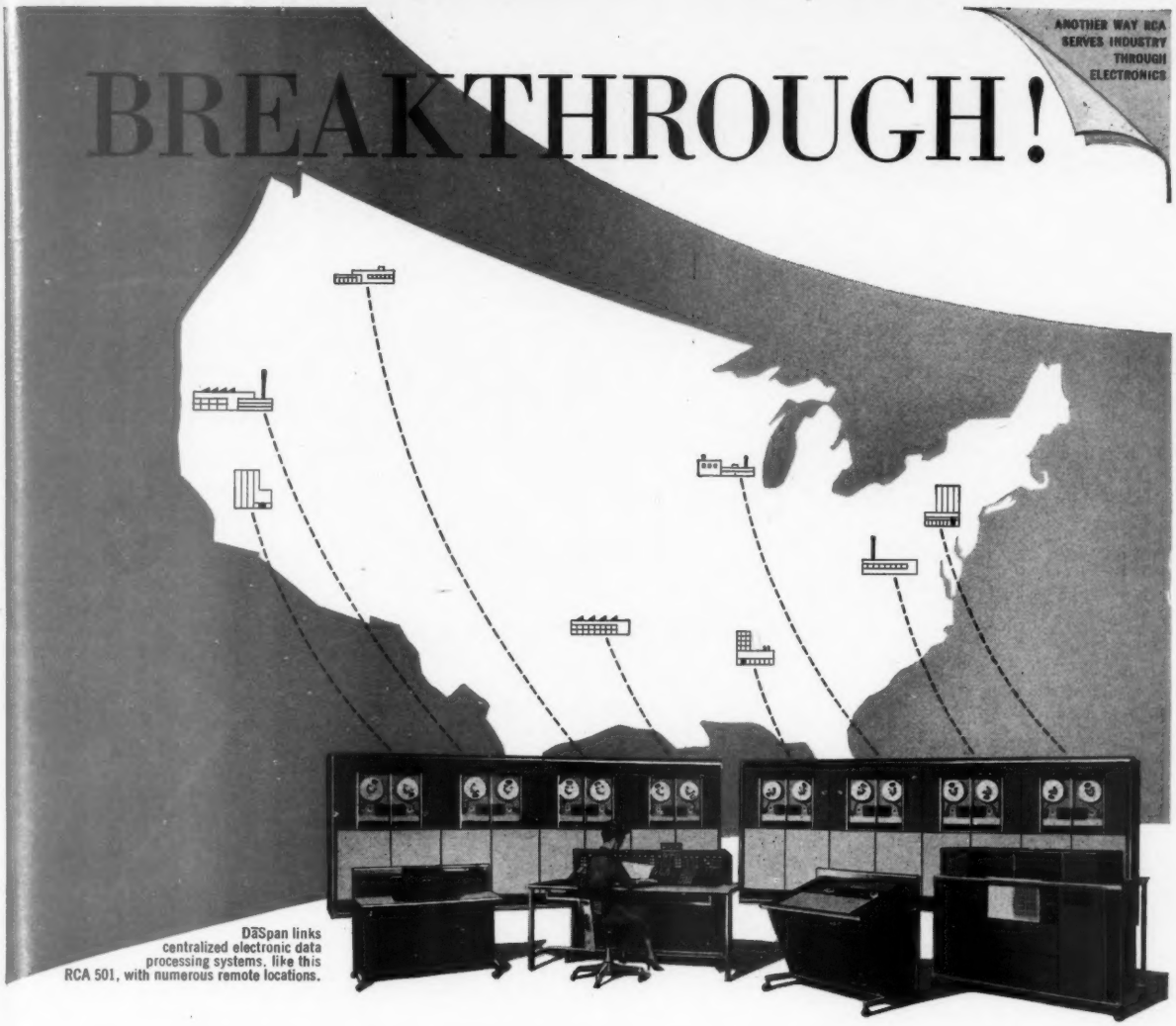

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DāSpan is the ideal solution to the problem of scattered facilities, to management's need for up-to-the-minute facts and to coordinating multiple EDP installations at low cost. In fact, wherever industry depends for its future on better control, on improved customer service and on last-minute information from every part of an operation, RCA DāSpan will open new avenues to profits and smoother functioning.

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What Air Force stands to gain...

to 8 million reproducible drawings right now, receives an average 75,000 new or revised reproducibles each month.

Over the next three years, AMC estimates it will use about 25 million aperture cards in lieu of full-size prints at the many AMC depositories around the country. Under normal operations, once the system is in full swing, it will probably provide an average yearly use of about 10 million aperture cards.

While the program will start with an Air Force model, it draws heavily on industry experience and that of other military agencies and industry in the field of mechanized engineering data. From the model, the program will get data cards and roll microfilm. From these will stem the required distribution of aperture cards to meet needs at Wright-Patterson and the local levels.

The distribution method (by model and within model by deck) has one big advantage—fast turn over from the old system to the new. With this procedure —master film, positive intermediate, and negative duplicate for distribution —we can distribute decks as fast as they are mounted. Decks are created in collated sequence, so that a steady flow of engineering data to the field can be maintained on a need-to-have basis.

Therefore, there will be a gradual but constant cutover of engineering data from full-size prints to microfilm aperture cards. As cutover increases, there should reap the major benefits possible with micro-mechanized engineering data for automated logistics.

The prime contractor should be a major beneficiary in this program, simply because he would rather be in the weapon business than in engineering drawing reproduction.

If microfilm and punch cards are submitted for a set of data to one agency, then that agency, not the contractor, will make distribution. The prime will no longer need to submit the same information to several agencies.

Most major contractors have the punch card equipment to make up the data cards required. Also, many have or can get the services to make a frame of microfilm for each drawing. The job of making a punched card, filming a drawing, and preparing an index should be far easier with much less administrative time than turning out bulk engineering drawings.

Moreover, the time required for filming and card punching favors the contractor. It should be easier and faster to get drawings filmed and back in the file with the new techniques than with present conventional ones.

Besides large contractors, there are small manufacturers who supply accessory equipment. In accessories, the drawings per set can vary from 12 to 8,000. Such manufacturers will find many reputable agencies with the know-how to microfilm and make punch cards to Air Force requirements.

Under Air Force procedure, 35 mm microfilm is being supplied for new and revised drawings. If a microfilm frame has already been furnished the Air Force for its MEDAL program, the film need not be resubmitted. Where no microfilm has been supplied, drawings and data are filmed by the contractor.

The Air Force aperture card file maintains the drawings by contractor and within contractor by drawing number. A second set of data cards provides complete engineering information for the item furnished. This set is filed by manufacturer; within manufacturer by model; and within model by drawing number. In this second set, there are cards for items previously furnished, with a card for each data sheet.

There are three phases in the Air Force distribution program. The first phase is a quality control; the second, reproduction of distribution of decks; and third, local distribution.

(Continued on page 31)

Background

THE PROBLEM: *To disseminate the common language (engineering data) of the Services and contractors for weapons and materiel development testing, production and maintenance, the Military Establishment spends $1.5 billion for drawings, another half billion or more for reproduction; receives six million new and revised drawings, maintains a file of 50 million drawings, distributes one billion prints—annually.*

FIVE GOALS OF STANDARDIZATION:

1. Achieve similar administrative and management controls within the Services.

2. Speed controls and minimize documentation time lag between agencies.

3. Insure adherence to military specifications.

4. Develop standard drawing notes depicting commercial and proprietary items.

5. Develop requirements for safe, adequate storage of drawing documentation, for obsoleting drawings when no longer needed, and for speeding up change procedures.

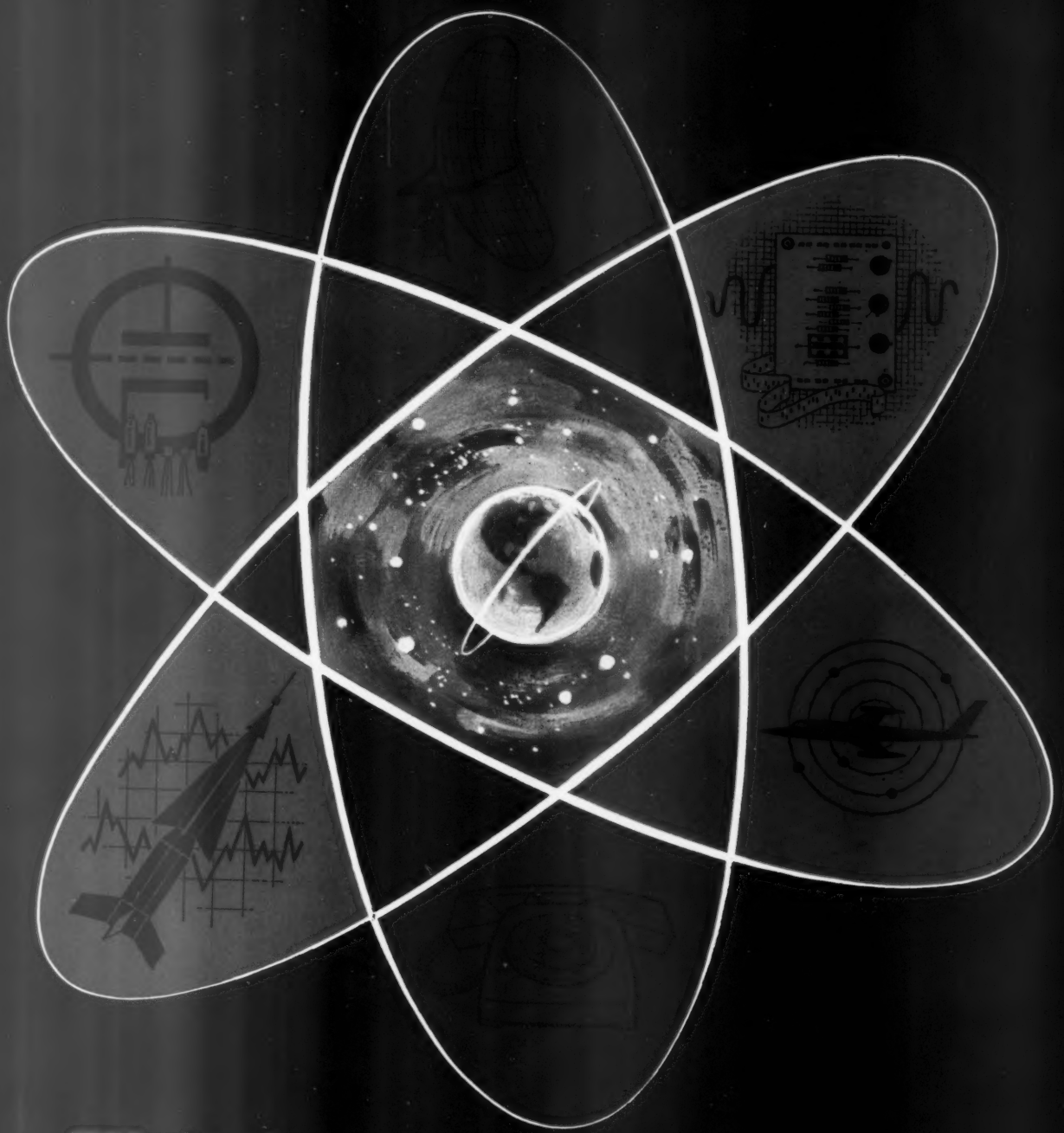
MANAGEMENT PRACTICES: *The military's method or system must be compatible with its industrial counterpart. Without such compatibility, the method or system does not solve the problem; it adds to it.*

STANDARDIZATION TRENDS: *The trend is in the direction of microfilmed records. There will be no attempt to standardize on proprietary makes and models. Specifications will deal with features essential to insure compatability and interchange of engineering data among the Services and contractors. Aim is to permit latitude in material and equipment specifications without impairing the data cross-exchange.*

Within the next three years in the Defense Department, 80 to 90% of new engineering data will operate from a microfilm base. For the DOD at least, there will be a greatly diminished use of materials to make reproducibles and non-reproducibles by conventional methods. In their place will be photo and electro static copies plus extensive printing from offset masters reproduced xerographically.

THE FUTURE: *The trend to miniaturization and automation of engineering and related data is no longer a trend. It is now a stampede. Emphasis on forward design in miniaturization and automation should be in the systems area. A designer should be able to dial or punch a number and within an hour receive a print at his desk.*

THE VITAL FACTOR: *Naturally, reduced costs to reproduce are good. So are the savings in space . . . and storage. Nevertheless principal interest is in the amount of time saved. Time is irreplaceable, cannot be measured in dollars, but can be measured only in terms of national security.*



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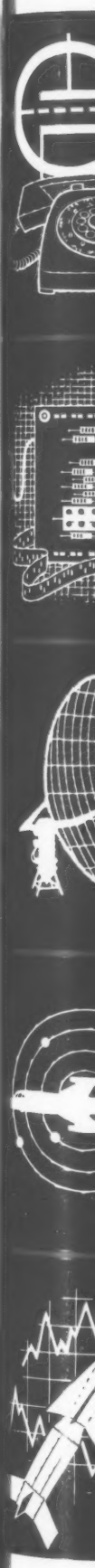
Quick-Reaction Capability · Efficiency · Financial Accountability · Experience



Communications Systems

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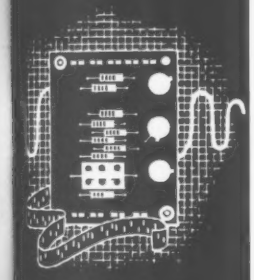
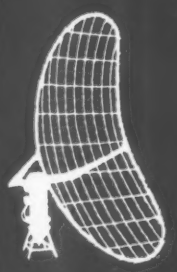


Data Processing and Display Systems

Sylvania has been heavily involved in special and general-purpose digital data processing since 1946. The most recent notable achievement in this field—the design and development of MOBIDIC. This solid state, mobile, general-purpose computer will give field armies real-time solutions to many intelligence and reconnaissance problems, near-instantaneous answers to operational problems involving logistics, inventory control, etc. Of great significance are advanced techniques developed for electronically driven electroluminescent display equipments and systems. SYLVANIA ELECTRONIC SYSTEMS has subsystem management and development responsibility for the data processing portion of the Air Force BMEWS program, including new concepts of 3-dimensional data take-off circuitry and equipment.

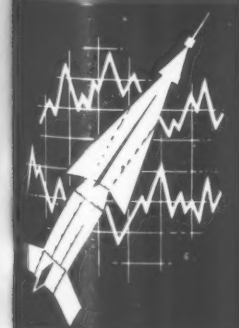


Detection and Tracking Systems

With the advent of satellites, IRBM's and ICBM's, early warning, detection and tracking systems become of paramount importance. SYLVANIA ELECTRONIC SYSTEMS has an advanced capability in high resolution, electronically scanned radar. As a specific example, Sylvania has management and development responsibility for the Army's AN/MPQ-32, a mobile artillery detection, tracking and fire control system.

Intelligence and Reconnaissance Systems

In recent years, Sylvania has developed numerous types of broadband receivers, signal analyzers, and sensing devices across the entire spectrum. Advanced anti-intrusion devices are now under development. In addition, Sylvania is developing and managing several other highly classified programs in this area.



Electronic Warfare Systems

Sylvania is acknowledged as one of the nation's leaders in electronic warfare in its broadest sense. This capability pertains to countermeasures and counter-countermeasures against all known types of electromagnetic radiation. In addition to managing such programs as the passive defense system for the B-58 and portions of the B-52 passive defense system, Sylvania maintains a complete quick-reaction capability and facility for a wide variety of Army ground-based electronic warfare activities.

SYLVANIA ELECTRONIC SYSTEMS now offers you complete horizontal and vertical integration of all the capabilities of General Telephone & Electronics. Vertically from raw materials to components and on up to equipments, subsystems and systems. Horizontally from complex operations research studies, to systems analysis, engineering and management, and all the way through conversion to production and quality field service.

Listed here are but a few system, subsystem, equipment or analysis accomplishments of one or more of the member companies and affiliates of this new and complete integrated systems organization:

COMMUNICATIONS

- Dial Telephone systems
- Automatic electromechanical and electronic switching systems (e.g. AN/FGC-30)
- Shipboard Automatic Telephone systems
- Digital communication equipment (e.g. AFSAY-D807, DEX-503, KX-3, F9-C, BLADES, ALPHA)
- UHF-VHF equipment (e.g. AN/ARC-3, -34, -36, -49, -50)
- Carrier equipment for DEWline, WHITE ALICE, TEXAS TOWERS, QUICK-FIX (e.g. 45BN, BX)
- Multiplexing equipment (e.g. Universal Multiplexer Set AN/FCC-17)
- Microwave Relay and Mobile Radio Systems (e.g. Microtel Type 74-A and Mobiltel)
- Automatic warning and alarm systems

DATA PROCESSING AND DISPLAY

- BMEWS data take-off and data processing subsystems
- MOBIDIC general-purpose digital computers
- UDOFT digital flight trainers
- Data processing subsystems for AN/MPQ-32, AN/ASD-1 and PLATO
- Sylvatron electronically driven electroluminescent display systems

DETECTION AND TRACKING

- PLATO anti-missile system
- AN/MPQ-32 detection and tracking system
- Phased array radar subsystems (e.g. PLATO, ESBR, ESAR)
- 219-L and 416-L system analyses
- AN/SPS-10 radar

INTELLIGENCE AND RECONNAISSANCE

- AN/ASD-1 reconnaissance subsystems
- ADAGE system analysis

ELECTRONIC WARFARE

- Passive defense system for B-58
- Passive defense subsystem for B-52
- Ground-based ECM systems (e.g. AN/MLQ-8, -9, -19, -21)
- PARADE CCM system
- AN/TLR-1, -2, -15, -22 ferret receivers
- AN/ALR-12 receiver
- AN/ALQ-6, -15, -16, -27 noise and deception ECM gear
- Proximity fuses

FOR FULL INFORMATION on how Sylvania Electronic Systems might be of special service to you, please call or write Sylvania Electronic Systems, a Division of Sylvania Electric Products Inc., Waltham, Massachusetts.

SYLVANIA ELECTRONIC SYSTEMS
Government Systems Management
for GENERAL TELEPHONE & ELECTRONICS

GENERAL SYSTEM

(Continued from page 26)

Under the quality control procedure, film received at AMC is checked for resolution, density, image centering, frame spacing and all factors set forth in the current microfilm specifications. Also, a proofing operation guarantees the index list is complete and accurate, while another check shows that the punch card and film data match.

If the number of rejects is less than 20%, Air Force asks the contractor to resubmit rejected data. If it exceeds 20%, Air Force rejects the entire roll.

Air Force turns inspected cards and film over to a film contractor. From the master film, the contractor makes a positive intermediate and necessary negative duplicate rolls for distribution decks. The positive intermediate is left in roll form.

The accompanying deck of data cards reproduces necessary decks of unmounted aperture cards. Reproduced cards are interpreted. Then the film is mounted into the aperture cards with semiautomatic optical mounters. This operation provides both a film centering and a data check.

After the decks of mounted cards are set up, they are distributed to Air Materiel Areas and Air Force Depots. On special requests, cards are also furnished to other bases or other services.

The Air Materiel Areas and Air Force Depots may have to generate local distribution for procurement, maintenance and supply. Such distribution is handled at that level with dry duplicate film techniques.

A major advantage in using microfilm is that the microfilm is a miniature reproducible. Thus, each Air Force activity can duplicate its own data as required. With this arrangement, Air Force expects to kill the problem of buying too many or too few sets of drawings.

Too much and too little marked the old system. The central repository might not have a full set of reproducibles, while field activities had prints that were not needed. This condition will be eliminated by distributing the film to each activity and allowing the activity to determine its own distribution.

Another weakness: illegible copy. Part of this problem was due, at contractor level, to unenforced engineering drafting standards. Then too, quality varied on reproducibles submitted. Such inconsistencies require variations in exposure in making prints. Microfilm standards should minimize this.

Naturally, space is a problem. AMC's central repository alone houses between 3,500,000 to 4,500,000 full scale reproducibles. Tight space for engineering drawings created all the problems of bad housekeeping—misfiles; dogeared and torn reproducibles; time lag in filing and distribution; and insufficient information.

To solve these problems, there are punch card accounting machine techniques, dry duplicate film procedures and the new compact reproducibles. Example: instead of 250 conventional engineering drawing files with stepladders for filing there are now 250,000 aperture cards in a single motorized file.

Improved Control

Moreover, punch card data will provide control over security classification, proprietary rights, interchangeability, model application, retirement of obsolete drawings, parts application data lists and the like.

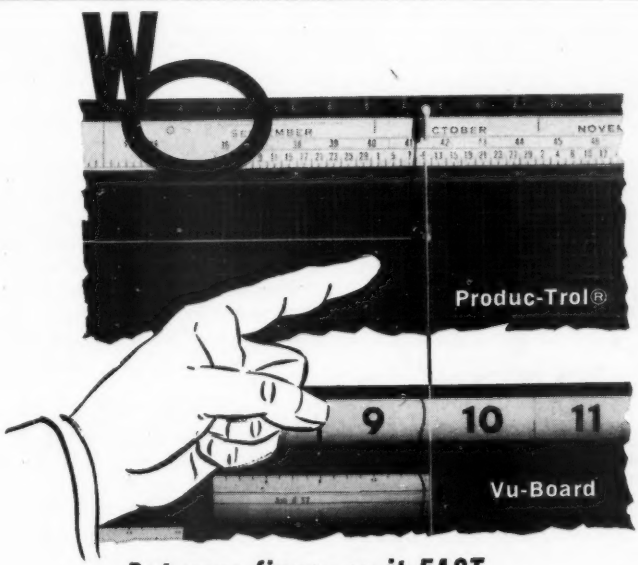
With dry duplicate film procedures, disposable aperture cards are feasible, so that data can be disseminated without disturbing the master file. Activities can be expanded as needed by creating new files from existing masters. Finally, it is typical of both military operations and reproduction room procedures that there are peaks and valleys in output. With the card-mounted miniaturized reproducible, there is a degree of mechanization not possible with conventional operations. This mechanization helps meet sudden demand with a minimum increase in personnel.

For the future, the Air Force says a key to real progress is that much of American industry is accepting the requirements for standards in engineering data retrieval and reproduction. Without such standards, there cannot be the new and better equipment and supplies desired for engineering data programs.

Furthermore, not only Air Force but all military agencies, as well as industry, are coming together to achieve a standard for engineering data interchange.

Now, we have one size of card, one size of aperture, one aperture location and one type of image—a negative image—for every engineering drawing and data sheet. Furthermore, we are on the road to photographic standards that assure automated reproduction.

Industry has helped by recognizing the need for enforcing the drafting standards to provide the source documents for microfilmed techniques. The one result of these standards will be standard specifications that apply to all military agencies. The hope is to eliminate duplication of unprofitable and costly paperwork. It is the best way to obtain the updated equipment that will make our jobs easier tomorrow.



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The Fable of the Purchasing Agent

The once-upon-a-time department comes up with an answer to a constant problem: How do you buy widgets at the best price for gizmo manufacturing

by Col. John D. Cole
Assistant Chief of Engineers for Troop Operations Department of the Army

ONCE upon a time there was a purchasing agent for The Gizmo Manufacturing Corp. whose duty it was to purchase periodically a large quantity of widgets for use by various agencies of the corporation. Now it happened that quite a few companies were engaged in the manufacture and sale of widgets, and the corporation policy required him to place each purchase with the lowest responsible bidder who could make a suitable widget.

Of course this enabled him to get the best initial price for each widget, but before long he found that the corporation was operating a half dozen or so different models of widgets, all of which required different spare parts. This also required much more training and skill by the operators and the mechanics, and to make matters worse the corporation's business required them to operate widgets all over the world. Naturally many widgets were deadlined for long periods and the cost sheets for widget operation made the comptroller very unhappy indeed.

Now the purchasing agent was an intelligent man and he didn't like to see the corporation lose money, so he suggested to the Board of Directors that they change the policy so that he could negotiate the purchase of widgets with just one manufacturer. He said that he could always reserve the right to change, and he was sure that the overall costs of widgets and their operation could be reduced tremendously.

This seemed at first like a wonderful idea, but one director spoke up and said: "That's OK, provided you do your negotiation with the "A" Widget Co. I happen to know that some of their stockholders also own large blocks of stock in our company and if we don't give them a chance to sell us *their* widgets I may lose my job as director."

Another said: "By Gosh, you're right. I know some people in the "B" Widget Co. too, and they will be very unhappy with me if I help to fix it so they don't get any of our business."

Well, it turned out that nearly all of the directors knew someone in the widget business and so the proposal was turned down. And the purchasing agent continued buying many different kinds of widgets and the corporation went on losing money.

Despite their losses on widgets, though, The Gizmo Manufacturing Corp. grew, and pretty soon they were buying lots of wadgets, wudgets and even wodgets and wedgets, each one of many models, with all the attendant difficulties. One day the purchasing agent noticed that nearly all of the companies that made widgets also made wadgets and wudgets, and some of them made wodgets and wedgets too.

This gave him a bright idea, so he asked the sales managers of all the companies in the industry to attend a meeting (which they were glad to do since he was buying quite a lot of their stuff).

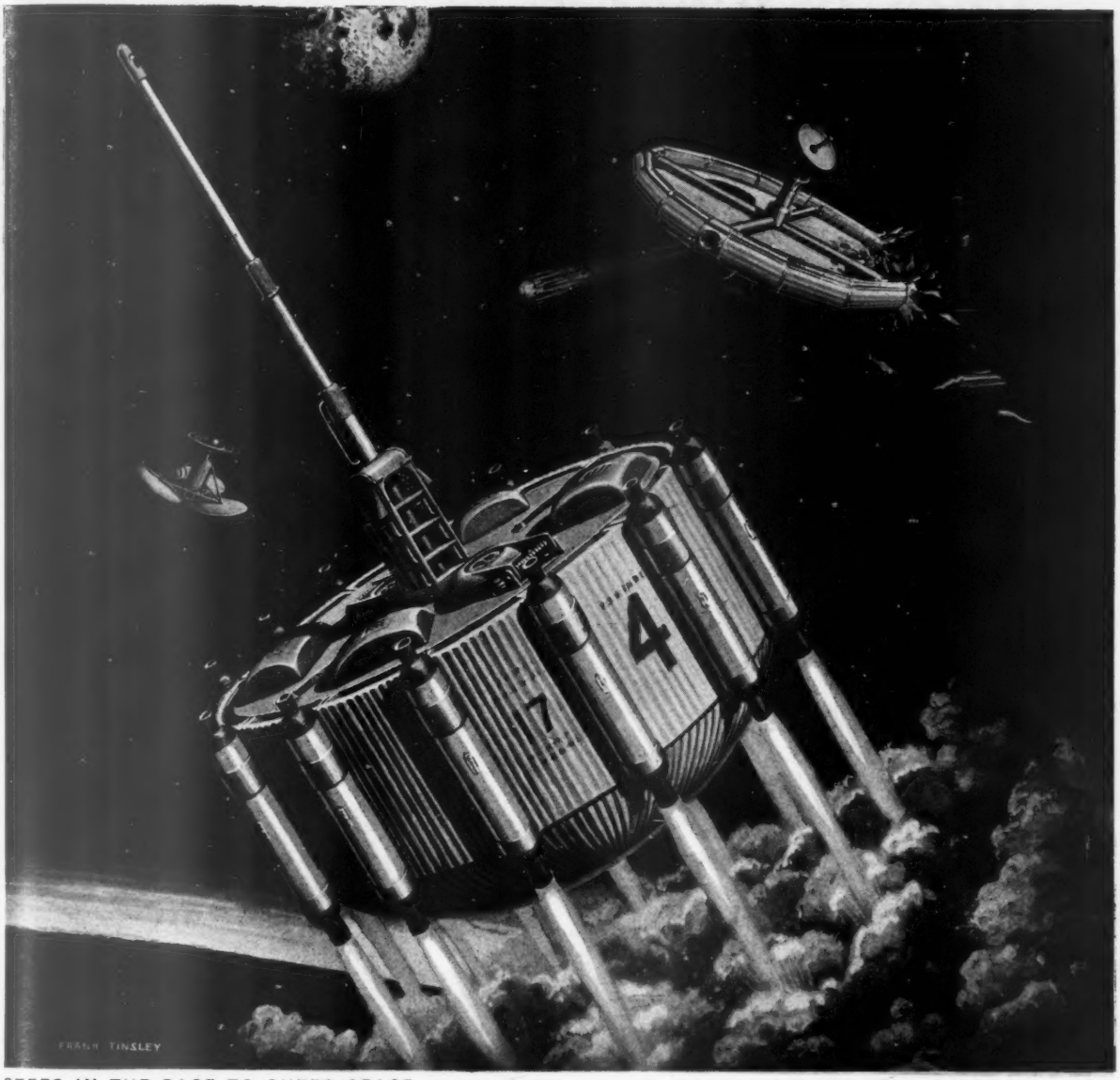
"Gentlemen," he said, "As you know, for many years we have been buying your products in large quantities and our policy has always been to buy from the lowest bidder. This results in having many different makes and models of each product and gives us many headaches in maintenance. It also costs us money and prevents us from buying as much as we otherwise might, since our overall budget is limited.

"Some time ago I proposed to our Board that I negotiate with just one of you when we buy widgets, but that was turned down since our directors did not want to antagonize all the rest. We buy, however, some of about everything your industry produces and all of you manufacture several products.

"Our business is such that we spend about the same amount of dollars each year and over a period of years the proportion we spend for each product is about the same. Suppose we agree to negotiate all widget contracts with the "A" company, wadgets with "B", wudgets with "C," and so on, so that each of you over the years will get a fair share of our business, we will get a good product and not be burdened with all the maintenance troubles, and all of us will be better off. Each of you can of course continue to sell all your products to other customers who do not have the volume or the overseas problems that we do. How does it sound?"

They all finally agreed that it was worth a try and so after much discussion they were able to reach an agreement as to who would sell the corporation which products. The purchasing agent made it quite clear though, that if any single company got any bright idea that they could jack up their prices and thus hold up the corporation, he could always turn to another for any one product.

This time the Board of Directors were quite willing to approve the idea since all the manufacturers had agreed in advance, The Gizmo Corp. prospered and everyone lived happily ever after.



STEPS IN THE RACE TO OUTER SPACE

Escape In Space

The space-assembled super satellites of the future will periodically encounter disaster—collision, mechanical failure, military attack, or the long chance of being hit by a meteorite. When this happens, "life boats" like the one shown here will bring their crews safely back to earth.

Here is the operational sequence of an escape in space:

1. Crew members don pressure suits and strap themselves into decelleration beds within the pressure-intact unit.
2. At the "Abandon Ship" signal, low-power, RATO-type launching rockets blast the sealed capsule from the threatened station (upper right illustration).
3. Acting on orders from an astrogational computer, the retro-rockets check the capsule's speed and break it out of orbit. (Foreground. Note details of offset heat shielding, hatches, slow-down parachute covers.)
4. As the capsule enters the outer atmosphere, the heat shield protects the astronauts. The life boat's momentum slows even further, and the shield is jettisoned as it cools.
5. Four parachutes are released, acting as air brakes. After a computed interval, other chutes are released.
6. The capsule lands in a predetermined sea rescue area, and a ring of flotation bags inflate. A radio broadcasts the craft's location, and a bright sunshade serves as a visual and radar target for rescuers.

ARMA, now providing the inertial guidance system for the ATLAS ICBM and engaged in advanced research and development, is in the vanguard of the race to outer space. For this effort, ***ARMA*** needs scientists and engineers experienced in astronautics. ***ARMA***, Garden City, New York. A Division of American Bosch Arma Corporation.

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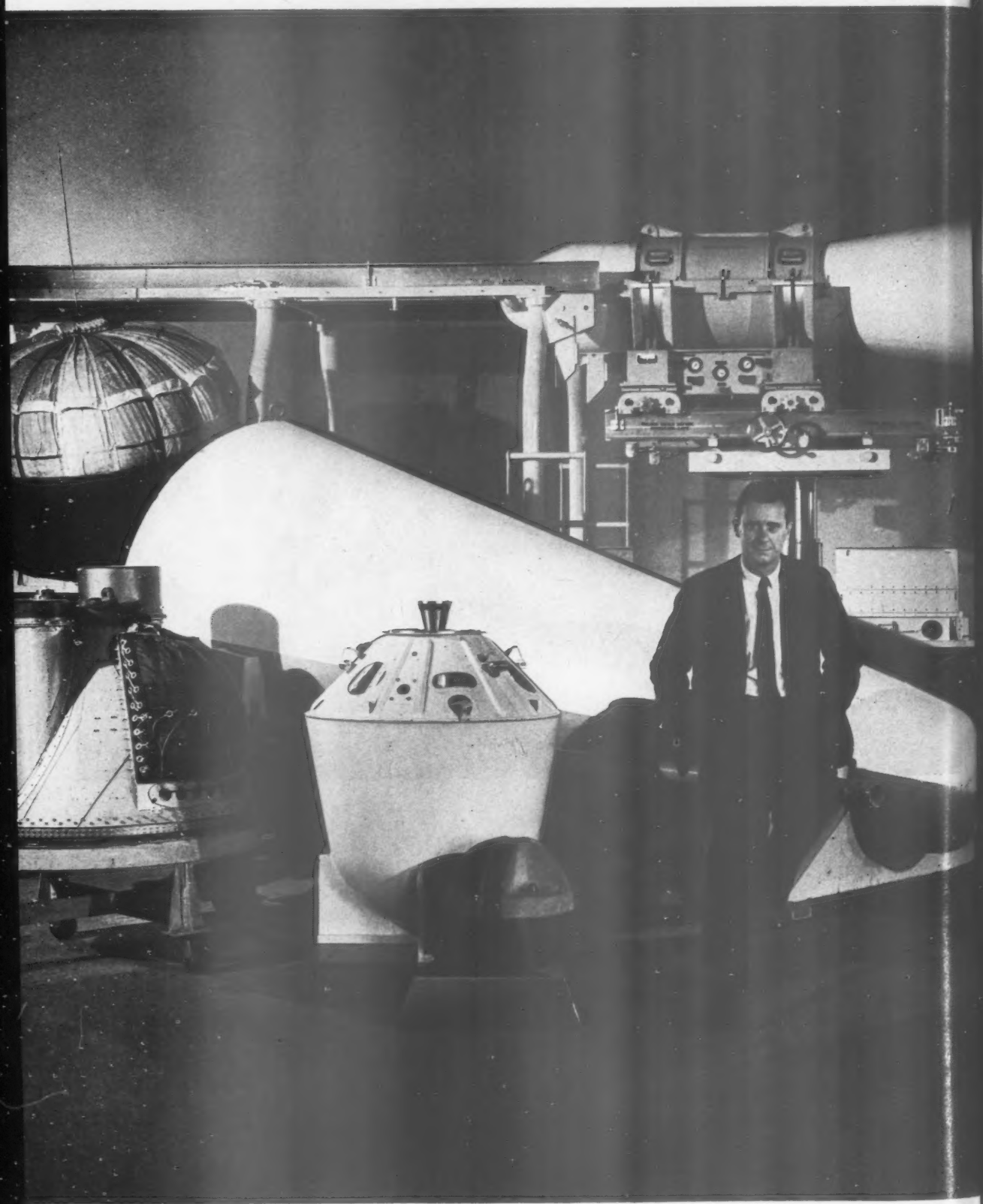
4000 subcontractors are represented
re-entry vehicle "family portrait"



dramatizing . . .

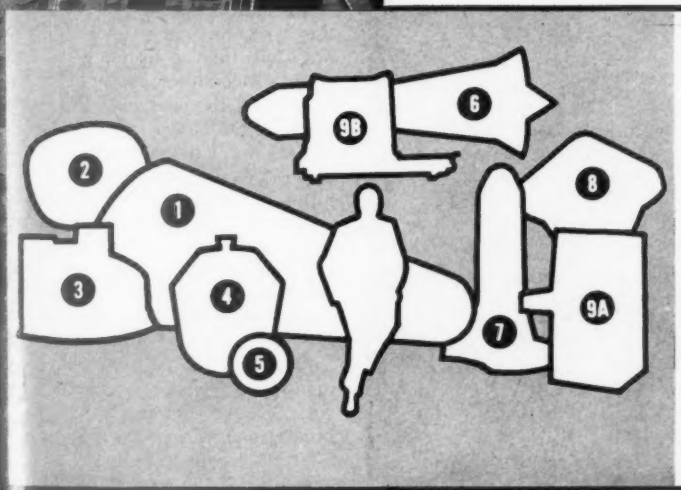
4 years of USAF, G.E., SUBCONTRACTOR re-entry vehicle progress

The key to this progress has been teamwork . . . teamwork between General Electric's Missile and Space Vehicle Department, the Ballistic Missile Division and the Ballistic Missile Center of the United States Air Force and the over 4000 small and large subcontractors alike who have helped MSVD make so many vital contributions to U.S. re-entry vehicle progress.

IN 1959 ALONE, the following figures indicate the emphasis MSVD placed upon this important factor of subcontractor teamwork on Air Force projects.

- Over 35,000 different purchase orders were placed by MSVD on subcontractors in 1959.
- More than 25,000 of these MSVD purchases were made from "small" subcontractor businesses.
- More than $26,000,000 worth of goods and services were purchased by these 35,000 orders. This amount represented a major portion of the contract dollars received by MSVD.
- And more than $13,000,000 of this $26,000,000 went to "small" business firms.

If you'd like more information about G.E.'s Missile and Space Vehicle Department . . . its subcontracting activities, its re-entry vehicle programs or about any of its space technology activities . . . write to Section 160-70, G.E. Missile and Space Vehicle Department, 3198 Chestnut Street, Philadelphia 4, Pa.



Mr. Hilliard W. Paige, General Manager, Missile and Space Vehicle Department with Air Force re-entry vehicles developed by MSVD.

1. RVX-2 Re-entry/Recovery Vehicle, the largest ablation-type re-entry vehicle to travel full ICBM-range and be recovered.
2. Flotation balloon used in recovering USAF-MSVD research re-entry vehicles.
3. Recovery equipment package for RVX-2.
4. Satellite Aeromedical Re-entry/Recovery Vehicle for USAF Discoverer Program.
5. Mark-2 recoverable Data Capsule which flew in Thor re-entry vehicle and returned first films from outer space.
6. Mark-3, an advanced operational-type re-entry vehicle for Atlas.
7. RVX-1, first ablation-type re-entry vehicle to be recovered after full ICBM-range flight.
8. Mark-2, first U.S. operational heat-sink re-entry vehicle now in use on USAF Thor and Atlas missiles.
9. Typical ground support equipment developed by MSVD for USAF use. (A) Mark-2 prelaunch check-out console. (B) Mark-3 missile mating equipment.

MISSILE AND SPACE VEHICLE DEPARTMENT

GENERAL ELECTRIC

A Department of the Defense Electronics Division

Eleventh in a series
on military contractor relations

How Crash Programs Can be Made to Work

Close cooperation between Army And Westinghouse X-ray Division meant the difference between a world-wide training stoppage and a smooth program . . .

by Walter Hampe
Westinghouse X-ray Division
and
Maj. J. M. Long
Ordnance Ammunition Command

WHAT can the Army do when it finds one of its key offensive weapons might have a defect—and the number produced runs into the millions?

This was the predicament faced by Ordnance Corps in early 1958 when reports from the field showed that some rounds of tank-defeating ammunition were probably defective.

Because of the wide spread use of this type of ammunition, the Pentagon and Ordnance Ammunition Command at Joliet, Ill. found themselves facing an entire series of questions to be answered. Could training schedules be maintained in the face of the suspected faults in the ammunition? Does the possible defect involve all types of the ammunition? What is the exact trouble —propellant or primer or both?

Army faced two obvious alternatives: first they could suspend use of all ammunition throughout the world; second they could continue to use the tank-defeating cartridges, and hope that no accidents would take place. After further tests, the Pentagon made its decision.

On a top priority basis, all Army arsenals and depots were alerted to freeze all shipments of the rounds that would be used for training purpose, and begin a crash program to inspect the primer of each cartridge case attached to these rounds through the well-known but tedious disassembly method.

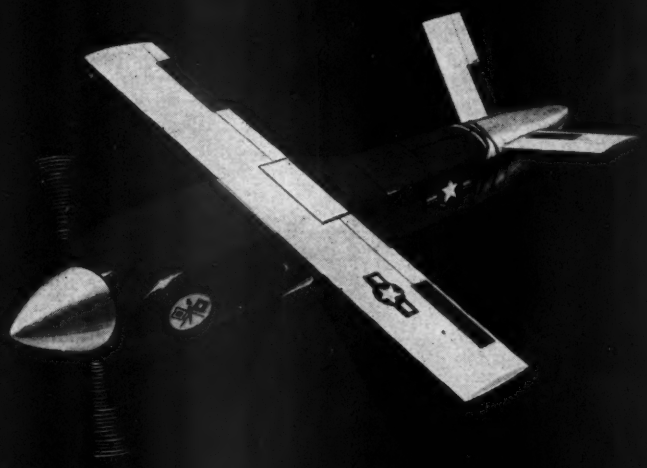
The job of pulling apart a shell of this type for inspection is both laborious and time consuming—consuming about 30 man-minutes per shell. Not only was the cost of this assembly costing Ordnance about $2.50 per round, but a percentage of the shells so inspected were rejected due to injuries incurred upon reassembly.

And so, as the production rate of inspection-approved shells increased throughout the system, the man-hour costs rose likewise, due to greater manpower needs for the increased production.

What Army had to do: decrease man-hours spent, thereby decreasing costs, and yet maintain the high quality control standards demanded of military ordnance.

Rejecting the present way of doing business, Ordnance began working as a team with an eye towards a new way of inspecting the shells. Such technical improvements and methods as using x-ray or fluoroscoping were among the suggestions submitted. Using about the same technique as

SURVEILLANCE DRONE SYSTEMS BY AEROJET



The Army's AN/USD-2 is today's most advanced drone system for gathering information on enemy battlefields. This high-priority Army program is a major part of Aerojet's acquisition of the Rheem Defense and Technical Products Division at Downey, California. Under the cognizance of Aerojet's Aeronautical Division, the SD-2 project is receiving increased emphasis during its advanced system development stages.

Developed for the Army Signal Corps, the SD-2 is launched from a standard Army trailer and flown by remote control to survey enemy positions. Its sensory compartment accommodates photo transmission systems, infrared, radar or other new electronic devices that transmit or bring back data. Outstanding characteristics of the SD-2 are the stable flight platform, sophisticated navigational system and unique parachute recovery, which make it ideal for a variety of military assignments.

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the fluoroscope in a shoe store, this method of inspecting the shells showed considerable promise.

Along with many other suggestions fluoroscoping was sent in to Ordnance Ammunition Command as a possible solution to the production-cost-quality control problem. Technically, Ordnance had to achieve better sight penetration of primer holes, increased speed on the assembly-line, and a high safety factor for inspectors who were faced with radiation problems.

At the same time Army who was wrestling with the shell inspection headache, several Westinghouse x-ray division representatives were working closely with Ordnance on a completely unrelated project and Army went to them for advice on the possibilities of using fluoroscoping in connection with the inspection problem. Comments C. V. Parker of the Ordnance Corps Field Service Division in the Pentagon, "It was just luck that we happened to be working with Westinghouse at the time."

Moving fast, Ordnance Corps called the Westinghouse x-ray sales office in Chicago, explained the program's urgency and asked if the company thought it could design and produce fluoroscope equipment to inspect the cartridges—in a matter of weeks. The Westinghouse reply:—can do.

In a matter of days, an Ordnance expert met with Westinghouse x-ray specialists in a secret meeting at the company's Baltimore Division to explain what was needed, why it carried top priority, and the deadlines that would have to be met to fulfill the many requirements for the shells.

A measure of the urgency: the first deadline for Westinghouse was five days hence, at which time Army wanted a complete set of specifications and drawings of the necessary equipment, plus a price tag for each fluoroscoping inspection unit.

The situation was summed up by one Westinghouse x-ray specialist: "It was like giving birth in five days to something that had a gestation period of six months to a year." Drawing on their long experience, Westinghouse suggested the following equipment: a 6,000 lb. portable x-ray tube concentrating its energy 3/10 of a millimenter square and providing 500 watts of heat.

Working 24 hours a day, Westinghouse met its dealine, and made its presentation to five different OAC departments. The simultaneous presentation saved time and cut red tape, and three weeks later, Ordnance ordered six fluoroscope inspection units.

Once the decision was made, an Ordnance-Westinghouse team negotiated the contract, approved the design and appropriated the money in only three days.

With one deadline out of the way, Westinghouse immediately was up against another one. Ordnance wanted first delivery in seven weeks. And it wanted a machine that would operate 16 hours a day, seven days a week on a production-line basis completed safe from x-ray radiation.

As Westinghouse met its production deadline, Army rushed inspection crews for instruction from company technicians on the first completed unit. Civilian trained operators accompanied the first unit to the field for installation, and the inspection program was underway—at Sierra Ordnance Depot, Herlong, Calif.

For the next five weeks, a custom-made fluoroscope machine came off the Westinghouse production line every seven days. As the production phase closed, the day-to-day management operation of the six installations began.

Among the first steps in the operating phase of the program was setting

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UNITED AIR LINES DC-8 JET MAINLINER, BY DOUGLAS

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up a check system whereby each shell inspector was constantly tested on his ability to count accurately the number of primer holes. Army used a spot checking method, under which rejected rounds were those with known defects would be reinserted in the assembly lines from time to time to see if the operator repeated his earlier judgement. The operators picked out the defective shells all of the time.

Production schedules, based on eight man teams, aimed for a low of between 800 and 900 rounds of ammunition per day. This meant approval or rejection of a shell using the assembly line method, could be completed in about eight man-minutes, compared with 30 man-minutes for hand disassembly.

As skill of the shell inspection crews increased at the six Ordnance installations, production began to climb. The flow of approved rounds reached an output ranging from 1400 to 1600 rounds per day within the first three months of the inspection program.

Among the techniques used to achieve this higher output, Ordnance, working closely with Westinghouse, set up management techniques including:

(1) Relocating fluoroscope units to installations with ammunition inspection programs to conduct for maximum efficiency.

(2) Advance orientation for technical and planning personnel of receiving installations on all program aspects.

(3) Modify units to commodate x-ray tubes having double service life.

Also, (4) negotiations with Westinghouse for technical service on the units to assure maintenance of fluoroscopes in line with applicable regulations. Finally, (5) Through more efficient material handling of shells in their fibreboard containers—placing the primers back to back—inspection and accuracy was speeded by 25%.

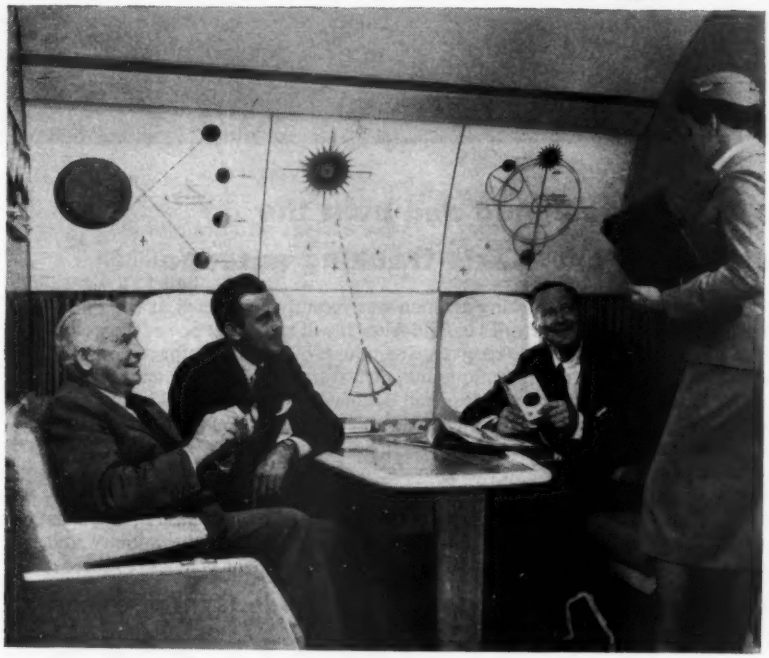
Figures at one ammunition depot—Seneca, N.Y.—revealed the significant contrast in efficiency and cost of the fluoroscopic inspection as compared to the earlier disassembly method. One planning official at Seneca, noting a 75% cut in personnel, combined with tremendous inspection savings per round, commented "it's sure saved us a pile of dough. If you multiply the savings at each command, it should run into a handsome amount."

On a cost-per-round basis, Ordnance Ammunition Command estimates that that the disassembly method ran to about $2.50 while fluoroscoping the shells cost only about $1.00. Savings that amount to $1.50 per round. The total savings, according to Army: "At least $2-million." Also, the Ordnance-Westinghouse team will have saved an estimated 1,100,000 man-hours by the end of the 90mm shell inspection program alone.

The lessons learned? Several recommendations have already been submitted by Army Ordnance management to reduce the possibility of any future crash inspection program. They are: (1) Fluoroscopic inspection for all ammunition after final inspection is made at the shell-producing facility. (2) Applying the fluoroscopic inspection to various fuzes and other ammunition components.

Also, (3) Expansion of the present program to check all present ammunition supplies—from 75mm to 106mm—for flaws in primers, welding, or other parts. (4) Changes in shell production procedures to tighten the quality and reliability of each round. Finally, (5) Consideration for use on special nuclear weapons.

But perhaps most important, the Westinghouse-Ordnance fluoroscopic program helped to overcome a huge potential bottleneck in the proper flow of ammunition throughout the world. Not one Army unit was held up in its training for lack of ammunition. The significance of this is measured by today's cold war situation where training for all eventualities is perhaps one of the keystones of preparedness.



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Research Rundown

BIGGEST MONEY PROBLEM IN ASW RESEARCH WORK is not necessarily having enough to work with, but finding projects that offer enough to be worth the expense they involve. Comments ASW Coordinator Yeager, "we're spending just about as much money now as we prudently can, given the state of the art."

THIS MEANS THAT NAVY IS CONFIDENT OF ITS EFFORTS, is not willing to go out on a limb with anything that isn't (in one Admiral's words) "pretty shocking." As one measure of this, there is the ease with which Navy has been able to get extra-budgetary funds (Defense Emergency Funds, supplemental appropriations) when they were really needed.

MISSILE-CARRYING NUCLEAR AIRCRAFT GOT AN INDIRECT BOOST by way of a RAND report assessing survival chances of high-flying aircraft (B-58, B-70) in an all out nuclear attack. The verdict: survival not too likely—emphasized by our own advances with Nike-type missiles. The obvious answers are first, the nuclear plane armed with ballistic missiles, and, second, on-the-deck missions such as have already been flown with B-58's on a test basis.

ANOTHER MOBILE-MISSILE POSSIBILITY COMES FROM NAVY'S Polaris, conceivably could be used on surface vessels. Points out one high-ranker, "this is where we proved it out in the first place." Guidance gear would offer the biggest problem, with pre-packaged fit-any-ship installations as one remote possibility.

QUIETLY RAISED EYEBROWS REGARDING AIR FORCE'S MIDAS are beginning to appear here and there in the Pentagon. The reasons: infra-red (the planned sensor device for Midas) has many drawbacks, including susceptibility to be hurt by cloud cover. Also, there is some question on how much information can be gathered this way—even assuming a basic spotting job, there is the question of identification.

ALL-OUT ARMY PITCH FOR NIKE-ZEUS APPEARS LIKELY to Congress and the public this spring, with the aim being to un-freeze frozen funds, if possible scaring up enough dollars to start long lead time production. Apparently the aim is to side-step what seems to be an impregnable set of obstacles up through the chain of command.

DEMONSTRATION OF HAWK KILLING HONEST JOHN was fairly obviously geared to prove a capability for knocking missiles down, was set up for best possible press coverage. Also, word has 'leaked' that a Jupiter/Agena combination would be used to test Zeus, using a boost/glide technique with Agena providing a power-diving target.

DOUGLAS 'SKY BOLT' AIR LAUNCHED BALLISTIC MISSILE has moved from the design study to the development project stage. The two-stage weapon will be used with strategic bombers, will have a range of about 1,000 miles. Other contractors include General Electric, Boeing, Northrop and Aerojet General.

SILENCE HAS GREETED A COMMENDABLE TEST RECORD that has been run up recently at Cape Canaveral. Four Polarises in a row have scored extremely well at 900 mile ranges—within yards of their predicted impact. And several other programs (Thor, Matador, Atlas) are working well enough to average just about a shot a day at the Missile Test Center.

Zeus Tests Proposed, Production Urged

Gen. Lyman L. Lemnitzer, Army Chief of Staff, has told Congress Army plans to attempt destruction of ICBM's and IRBM's with the Nike-Zeus missile, and has asked Congress to continue the development program.

To cost about $137-million, the tests would be conducted in the Pacific Ocean. Scheduling was censored out of the testimony. Lemnitzer pointed out that Zeus would never be perfect, "But I think it should be apparent, even to an amateur, that if the enemy can't take his . . . missiles and be certain that he can put them down on certain given targets if some of them are going to be shot down by an anti-missile missile, then there is another factor of uncertainty that is ground into his war planning."

In other testimony, retired Maj. Gen. J. B. Medaris called Zeus "our only conceivable positive defense for the next ten years," and urged that Congress order immediate production.

Medaris also told Congress that the U.S. space effort should be directed by a single agency under the military. Scoring the present NASA/military arrangement "illegal and incorrect," Medaris said that "what is everybody's business ends up being nobody's business."

Communications Center Opened at Leavenworth

A fully automatic communications relay center—Midwest Relay Center—has been officially opened by Army at Fort Leavenworth, Kan. It is the second of three such stations that will eventually give army a full automatic world-wide communications system.

Capable of handling some 200,000 messages a day, the Center cost about $10-million, and will serve the entire continental United States. Prime contractor for the majority of the communications equipment is Automatic Electric Co.

Besides automatically routing all messages, the Center is set up to recognize and allow for six levels of message priorities, storing those of lesser precedence while priority messages go through. This can be accomplished so fast that the receiving station can get signals before the entire message is in the center for processing.

While the station now handles only teleprinted messages, it will eventually be able to take care of other means of communications. Already operational is a similar station in California, with the third and final Center to be completed at Fort Detrick, Md.

Advanced Version of B-58 Under Consideration

A better chance for an all-supersonic version of the B-58 Hustler has resulted from the administration decision to cut the B-70 program.

Dr. J. V. Charyk, Deputy Secretary of the Air Force has told the House Appropriations Committee that "I think on the basis of the information that we have now it (B-58C) is attractive." The plane would be available in 1963.

Charyk pointed out that many problems would have to be investigated before such a program could begin. These would include extent of necessary redesign, actual costs, and whether such a plane would be a completely new aircraft or a modest modification of the present B-58.

The B-58C, according to estimates, would cost about half what a similar number of B-70's would, and would be ready to fly some two years earlier. Such estimates are based on the assumption that major re-design would not be needed.

However, the Committee was told that B-58C would not have the same potential as a transport prototype that the B-70 did.

Commenting on the nuclear-powered aircraft program, Charyk said that $150-million would be available for Air Force and Atomic Energy Commission in fiscal 1961 for nuclear propulsion. Charyk said state-of-the-art is still the anchor on this program.

Priorities Explained By AF Research Command

Air Research and Development Command has explained its rules for assigning projects to various priority categories in a new regulation, AFR-80-11. The regulation outlines four different priorities.

These are: (1) Operational systems considered to be vital to survival when they are scheduled to be operational; Operational support items needed to provide new capabilities vital to support of AF missions; Advanced systems, subsystems and applied research needed for technological capabilities vital to development of future systems.

(2) Operational systems considered essential to military strength; Support items required to eliminate deficiencies in AF capabilities; Advanced systems, subsystems and applied research needed to avoid down-grading of future operational capabilities.

(3) Generally designed to yield continued advances for improvements within budget limits. This covers systems or support items which would increase capabilities and advanced systems, subsystems and applied research which will provide more timely achievement of capabilities but which do not offer major increases in technological capabilities.

Finally, (4) All other operational systems, support items, advanced development and applied research.

B-70 Prototype Costs Set At $400-million

The lone prototype B-70 Mach 3 research aircraft will cost the Air Force $400-million according to prime contractor North American Aviation. A second prototype would cost only $40-million additional.

At the same time, Convair/Fort Worth has set $6.6-million each as the price tag for its B-58 bomber, based on a production run of 200-300. To date, Air Force has ordered 66 B-58's, is negotiating for 20 more with fiscal 1960 funds, and has included further funds in the fiscal 1961 budget.

Jack J. Jones, Weapon System Manager for the B-70, speaking of the tremendous savings to be gained by greater production of the B-70 said, "It is inconceivable to me that the United States, in her current uncertainty over her defense future, would voluntarily abandon the one strategic weapon in which we clearly lead."

Plastics Test Center Established by DOD

Defense Department has established a Plastics Technical Evaluation Center at Picatinny Arsenal, New Jersey. The new center will be directed by Dr. Herbert F. York, Director of Defense Research and Engineering.

The center will collect, evaluate, store and disseminate technical information on current development, engineering and application in plastics and

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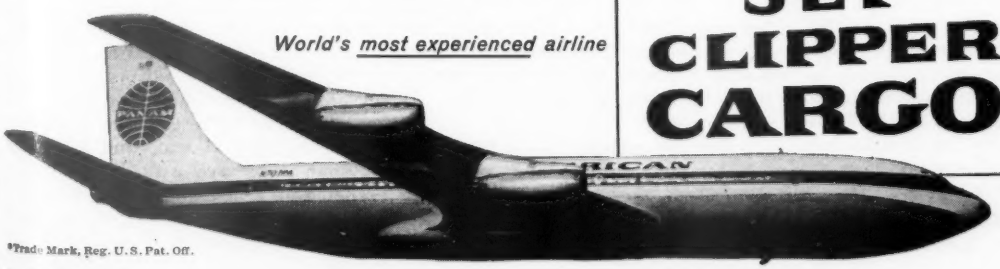

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reinforced plastics. It will also provide technical aid and consulting service to military contractors and suppliers on using plastic materials.

The Picatinny group will concentrate on applications for electrical, mechanical, packaging and structural uses. It will also work with advances in standardization of processes, products, testing methods and materials.

Space Systems Analyzer To be Built by Air Force

Air Force has completed plans for a multi-million dollar "Space Systems Analyzer" to be built at Wright-Patterson Air Force Base, Ohio.

The system will test systems and subsystems for present and future space satellites and advanced aircraft in three dimensional vibration, high and low temperatures, high vacuum, temperature gradients, roll, pitch and yaw simulation rotation, buffeting, variations of atmosphere, controlled ground speed, reflected and transmitted signals, and a variety of target types.

To occupy an entire hangar, the system was conceived by James C. Haley, Chief of the Design Techniques and Analysis Section of the Aero Reconnaissance Laboratory at Wright Air Development Division. The system will take about two years to build.

Logistic Research Survey Released by DOD Office

A complete rundown of logistic research projects in each of the three services is the subject of a 34 page booklet recently released by the Office of the Assistant Secretary of Defense for Supply and Logistics.

Dated January 1960, *Better Management Through Logistics Research* is the third edition in a series covering this area of work. Listed are some 53 logistic research projects, along with an Introduction and a Bibliography.

Subjects currently under study in the services include, under Army: Inventory Modernization; Concept of Logistics Operations and Support of U.S. Operations in Limited War Areas; Application of ADPS to Movements; Strategic Lift for a Future Army.

Under Navy programs include: Reduction of Procurement Lead Time; Afloat Data Processing. Some Air Force programs cover: Installations and GSE for Missile Systems; ICBM Maintenance of Operations Interactions; and Integrated Weapon System Management.

The booklet, which gives a brief rundown on each project listed, is available in limited supply from the Research Analysis Division, Office of the Assistant Secretary of Defense (S&L), the Pentagon, Washington 25, D.C. Distribution of the booklet has been made through normal channels.

Weather Warning Aid Developed by Army

A fast weather-observing system that instantly finds lightning discharges associated with severe storms over most of North America and reports this data much faster than is presently possible is being tested by Army.

Developed by Army Signal Corps, the experimental equipment is operated by Air Force Air Weather Service Personnel, and is located at one central and six auxiliary stations around the country.

Detector stations have special radio receivers to pick up static generated by lightning. Each station that picks up the static relays information to the central station where it is displayed on a special electronic map.

The various stations have ranges of about 2,000 miles, and a series of reports in a localized area indicate that a storm is brewing. Potentially the system would find great use at sea, where weather stations are necessarily more sparse than on land.

Operational Midas Urged by Schriever

Defense Department is giving serious thought to going operational with the Midas warning satellite, according to Lt. Gen. Bernard Schriever, Commander of the Air Force Air Research and Development Command. Schriever has said he has been "hounding DOD for some time on this one."

Midas is a satellite system that would be used to detect enemy missile firings with infra-red sensors. Presently classed as a research project, Midas was only recently transferred to the Air Force from Advanced Research Propects Agency.

Speaking before the House Space Committee, Schriever said it would be "entirely appropriate" to lodge responsibility for development of Saturn, Nova and other large boosters with National Aeronautics and Space Administration. Air Force interest in space during the next decade won't go beyond low-orbiting satellites, the AF General said.

Schreiver defined "low-orbiting" as vehicles going a maximum of 24,000 miles from the earth. Schriever's remarks to the committee were in direct contrast to those of retired Army space chief Maj. Gen. J. B. Medaris, who told Congressmen that all space projects should be lodged with a single military agency for maximum effect.

Observation Island Set for More Tests

Navy's test ship, the USS Observation Island, has started training exercises at Cape Canaveral, preparatory to resuming on-board test firings of Polaris IRBM test prototypes.

The ship hurls missiles from a compressed air tube on its deck. From this tube, missiles are thrown to a height of about 75 ft., where rocket engines ignite and take over. The launch tube can elevate some 10°.

Navy has set no date for resuming shots with the Polaris from Cape Canaveral, but best guess is that these should resume in the fairly near future.

Minuteman Operational Date Set in 1962

First Minuteman missiles will become operational late in calendar year 1962, according to Air Research and Development Command Chief Lt. Gen. Bernard Schriever.

To date, five tethered tests on the missile have been carried out successfully at Edwards AFB, Calif. Although the missiles will be ready to go in 1962, first squadrons will not come until 1963, Schriever said.

Reason for the discrepancy lies in the longer lead time needed to build bases or railroad bases for the missiles, and to train the crews to man them.

Message Switching Unit Designed for Field Use

The first completely electronic communication switching center ever designed and built specifically for military field service has been delivered to the Army Signal Corps at Fort Monmouth, N.J. Builder of the unit was Stromberg-Carlson Division of General Dynamics Corp.

Using high operating speeds allowed by transistors and diodes, the system will yield maximum efficiency and flexibility to the field commander. Designated AN/TTC-12, the unit is a 200-line local switchboard.

Scheduled for delivery later this year are three different types of the switchboard. These will include a "long-distance" board, and a tandem system to be used with divisional level operations. All units can be used with the Stromberg-Carlson transistorized field telephones.

The already delivered set is currently undergoing Signal Corps evaluation tests.

The switching centers are contained in compact aluminum huts, about seven feet square and roughly 12 feet long. They may be carried by truck, plane or helicopter. The units can handle facsimile, highspeed digital data, slowed-down video signals, microwave, carrier or wire line, teletypewriter. All switching is electronic and fully automatic.

Thor is First Missile Stored at AF Depot

San Bernardino Air Materiel Area at Norton AFB, Calif. is the first Air Force depot to begin storage and maintenance of ballistic missiles. Recent arrival of the first Thor at San Bernardino culminated over two years of planning, and represented what will be the first of a steady flow of the missiles to the depot.

A full repair and modification capability will be phased in gradually at SBAMA. In part, this is the inspection and removal of components, check-out of sub-systems and purging and preservation of engines.

First Thor came from Douglas Aircraft Co.'s test facility, where it had been evaluated. In the future the missiles will come from operational sites. Guidance systems will be stored separately in carefully controlled environments.

Norton will later take over similar responsibilities on Atlas and Titan. Air Force predicts no increase in personnel as a result of the new responsibilities.

Industry Developments

Ehricke Pushes Nuclear Booster

Dr. Krafft A. Ehricke, project director of Convair's Centaur development, has urged the start of major development of a nuclear rocket system, not later than the fall of 1960 or spring of 1961.

Nova, he said, represents the ultimate in chemical rockets. He said "early concentration on development of nuclear propulsion probably affords us our best chance of leapfrogging the Russians in space progress."

Ehricke said the Nova system would have a takeoff weight of 4 million lbs., and develop 6 million lbs. of takeoff thrust to move a payload of 200,000 lbs. into a 300-mile orbit.

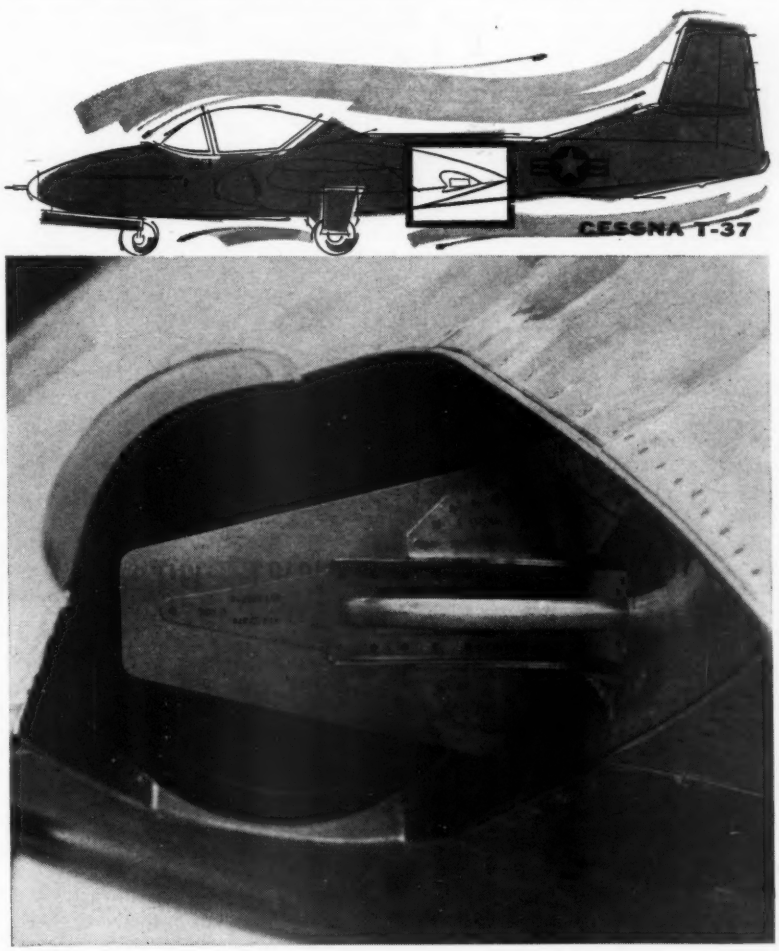
By contrast, Helios, an elementary nuclear rocket with a first stage chemical booster would weigh 1.8 million lbs. at takeoff and would develop a 2.4-million lb. takeoff thrust to deliver 230,000 to 250,000 lbs. into the same orbit.

New Research Reactor Designed by Aerojet

A special nuclear reactor which will embody several new concepts in being designed by Aerojet-General Nucleonics for the Army's Aberdeen Proving Ground.

The project, performed under an Army Ordnance contract, will be known as Opera, for ordnance pulsed experimental research assembly. It will produce pulses of radiation.

Fissionable material in Opera will be arranged in a layered structure so that thermal expansion occurring in the core during pulses will not generate thermal stresses. Fuel element will be a stabilized uranium alloy. Preliminary design on the reactor will probably be complete in about six months.



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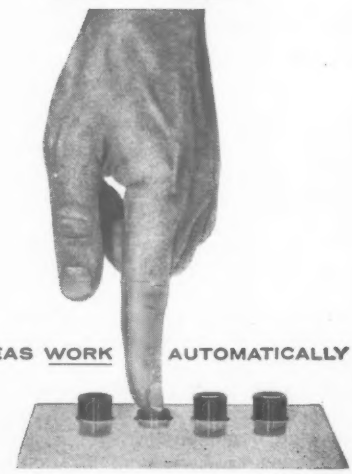

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Procurement Trends

STUDY GROUP ON 'SINGLY MANAGED' COMMUNICATIONS will probably turn out to be one of the busiest groups of studiers going, is going to have to work hard to come up with any results at all. Because of the basic nature of communications to any sort of military operations, each of the services has heavily vested interests, will be reluctant to let go of what they have.

TYPICAL ATTITUDE IS ONE OF SKEPTICISM, as expressed by one high-ranking communications officer: "What we have so far is agreement in principle, which isn't much of a trick to do. What is still needed is agreement in detail, and this is going to be tough."

OTHER ROUGH SPOTS IN THE ROAD THIS IDEA MUST TRAVEL include funding and dubious advantages to be gained. To make all existing long-haul communications compatible is going to run up a considerable bill for retrofit type work. Because communications use-rates in all three services are high—even in peace time—the amount of duplication to be eliminated is not all that it appears to be.

SMALL BUSINESS CONTRACTING IS AFFECTED under recent changes in ASPR's, with the requirement for Defense Business Subcontracting Small Business Clause now written into all contracts over $1-million which offer a chance for subcontracting. Short-form settlements on terminations may now be used for procurements up to $2500, instead of the former $1000.

MEASURE OF THE IMPORTANCE OF ASW TO THE NAVY is offered by one flag-ranker with the Atlantic Fleet: Almost all of the submarines we have in the Atlantic have anti-submarine warfare as their primary mission. This is because they are the best means to date of finding other subs, are not affected by so-called "thermal layers" in the water, which render sonar useless.

THE ERA OF SOLID-PROPELLED MISSILES comes nearer, with the Air Force announcement of a 1962 operational date for Minuteman, with first actual squadrons set for 1963. First Polaris is due this year, and by '62 the sub-carried missile should be available in some quantity. In Army's arsenal, first limited-range (35 mi.) test of Pershing announced as being successful.

LIGHT WEIGHT ITALIAN-MADE HOWITZER is generating wide interest, throughout NATO nations, appears likely to be incorporated in the Marine Corps inventory here. Weighing only 2,860 lbs., the weapon can fire an average 5½ rounds per minute, will disassemble to five man-carryable pieces.

EXCELLENT RATE OF RELIABILITY FOR BULLPUP is being claimed by the Navy—in the neighborhood of 90-95%. This is even more remarkable since the missile is unpacked, loaded and fired with no checkout. Navy claims savings because of this in the area of $7-million a year, and may apply it to other missiles. Air Force, meanwhile, has announced plans to put nuclear warheads on their version of Bullpup.

SHORT MILITARY LIFE FOR THE M1551 Ford-built aluminized jeep seems to be in the cards, with no money to buy the vehicle in this year's budget. On the other hand, the M38A1 version, built by Willys is working well with the Marines, with negotiations now in process for an added Marine purchase. In the same area, Marines seem to be paying more attention to the Mechanical Mule as a handy combat tool to have around.

Flexible Spending Bid Endorsed by House Group

House Armed Services Committee members tend to go along with a strong Air Force bid for retention of flexibility in a new law requiring double spending checks on operational aircraft, missiles and ships.

The group recently heard closed-door arguments that new legislation to place operational weapons under separate authorizations apart from the appropriations would require a complex and costly additional accounting system.

While the law will not take effect until fiscal 1962, this year Defense had to submit a preliminary report on all major weapon systems procurement and plans for financing them. Also requested was a plan to permit advanced authorizations of programs including long lead-time items.

Brig. Gen. Robert J. Friedman, AF Budget Director, warned of the problems in applying line-for-line authorizations on weapon systems. He said, "We cannot identify which dollars applied to a given aircraft procurement are new appropriations, which are recoupment dollars, or which are reimbursement dollars."

He continued, "In fact any attempt to so would require a complex and costly additional accounting system and would serve no useful purpose." "Instead," he said, "Air Force hopes to retain flexibility to increase or cut amounts applied to given line items (of the program) to allow for changes in requirements, changes in priorities, or technological developments."

Under the existing system, Air Force may reprogram up $5-million, or institute a new program of less than $2-million, without prior approval by the Secretary of Defense. Quarterly reprogramming reports are submitted to Congress.

To retain flexibility, Friedman urged that this process not be changed.

DOD Common-Use Items Will Transfer to GSA

Defense Department plans to transfer up to a million dollars a year worth of common use procurement items to General Services Administration within the next few years, Assistant Defense Secretary Perkins McGuire told a Joint Congressional Economic Subcommittee.

McGuire said GSA will probably buy about $650-million worth of DOD supplies in fiscal 1960. FY 1958 figure was $354-million. These are mostly commercial items purchased under formal advertised bidding procedures, he said.

But, McGuire said 68% of total procurement expenditures in fiscal 1959 under major weapons categories will continue under negotiated contracting procedures. McGuire said the increasing amount of defense money going into R&D rather than production means there will be no reversal of the trend to use of more cost-reimbursable type contracts.

He said that such contracts now represent 40.9% of military contract dollars. He added that it was defense policy to use this type of contract only when "the nature and perplexity of the procurement is such that the cost of performance cannot be estimated with reasonable accuracy."

GAO Charges High Costs In Nike Procurements

General Accounting Office has told Congress that "unreasonably high" prices were paid on more than $2-million worth of purchase orders for Nike missile parts. Specifically criticized were buying practices of Douglas Aircraft Co., Inc., a subcontractor on Nike-Ajax and Nike-Hercules air defense missiles.

GAO charged Douglas with accepting prices that were unreasonably high when compared with previous costs in ordering parts. As a result of the audit, both Douglas and Army have acted to tighten contract supervision, GAO said.

Parts were purchased from Aerojet General Corp., Radio Plane Co., and J. C. Peacock Machine Co.

Army has also revealed its original request for fiscal 1961 Nike-Zeus program was cut from $1.537-billion to $302-million by the time it was included in the President's Budget. The President's budget request includes $287-million of a total of $328-million requested for research, development, test and evaluation, $15-million for test facilities and nothing for either procurement or military construction.

Army had wanted $805-million for procurement and $389-million for construction. Also, Army is faced with an

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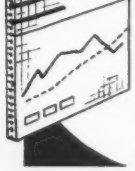

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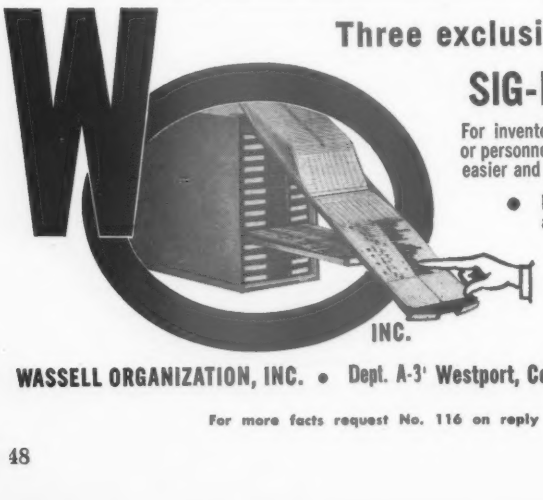

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expenditure limit, which Army Secretary Brucker said was imposed by Dr. Herbert F. York, DOD Research Director. About $100-million is being made available for basic research on Project Defender, which uses all other ways of tracking incoming ballistic missiles.

Davy Crockett Buy Set up by Army

Defense Department fiscal officers say Army plans a second major purchase of the Davy Crockett—a nuclear rocket for front-line troops. Army has previously refused to discuss details of procurement of the weapon.

Comptroller Franklin B. Lincoln, in his first appearance before the Senate Defense Appropriations Subcommittee, said that $2.2-billion of the $3.8-billion in planned missile obligations will be earmarked for the four chief strategic missiles—Atlas, Titan, Minuteman and Polaris.

This compares with obligations of $1.6-billion in FY 60 and $1.3-billion in 1959. "Including the research, development, test and engineering, and construction (and for Polaris the cost of the submarines), the total amount programmed for these four systems will rise from about $2.4-billion in 1959 to about $3.4-billion in 1961, an increase of over 40%," Lincoln said.

Lincoln said new obligational authority for Atlas in the 1961 budget, with prior-year funds will provide for all 13 squadrons planned. But, he said, more money will be needed to complete installation and checkout of equipment and ground support equipment.

GAO Wants Re-Evaluation Of Contract Financing

General Accounting Office has recommended that Defense Department re-evaluate its requirement that contractors finance 20% of contract costs incurred before delivery of end-items in cost-plus contracts.

GAO said that "although the purpose is to furnish the contractor with an incentive to reduce costs, we believe it is questionable whether there is sound justification for allowing . . . fees which exceed the government's estimated financing costs."

Air Force, confronted with GAO findings last spring, defended its policies, contending that it has been effective in holding down premature accumulations of inventories, needed under rapidly-changing weapon systems technology.

The Accounting Office urged that Defense and the Air Force undertake a critical evaluation of the directive in question. The agency also said that the policy should not be followed unless "identifiable cost savings could be demonstrated."

Missiles Cost Only 20% Of Total Missile System

Cost of an actual missile represents only about 20% of the total missile system, according to Major Gen. O. J. Ritland, Chief of the Air Force Ballistic Missile Division.

Ritland said "to make ballistic missiles effective we have had to spend great amounts of time, effort and money toward creation of ground support equipment, training of personnel, establishment of test, tracking and analysis facilities, and the design and construction of bases."

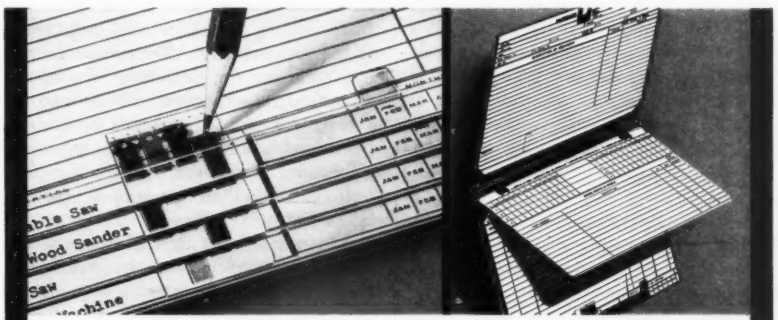
On the other side of the coin, Air Materiel Command's Aeronautical System Center has released figures indicating that ground support costs for aircraft will begin to drop off during the current fiscal year (see chart). Major reason for the drop off in spending in this area hinges on improved standardization procedures being used by ASC.

GSE Funding Trending

Fiscal Year	Dollars In Millions ASC Spendings
1957	159.2
1958	343.8
1959	574.7
1960	574.8
1961	560.2

Speaking to the Institute of Radio Engineers in Los Angeles, Gen. Ritland said not only did this ground support equipment make ICBM's possible but it also furnished a "ready-made base from which to project our national space effort."

Ritland noted that space had strategic importance that could not be overlooked now that the U.S. no longer holds a monopoly on nuclear knowledge and delivery systems. He said that the principal value in space lies with early warning and intelligence, with communications advantages to follow.



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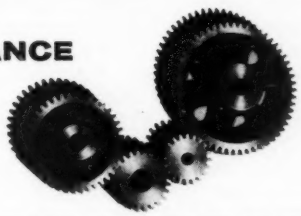

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Pentagon Profile

This Month:

J. Robert Loftis

Administrative Assistant to the Secretary of Defense

ADMINISTRATIVE support, by a number of people a vaguely understood operation, is not a phrase which ordinarily stirs up much excitement.

But administrative support is about as successful to the efficient functioning of an executive operation as wheels are to an automobile.

Top man in this field in the Defense Department is J. (for James) Robert Loftis, Administrative Assistant to the Secretary of Defense. A little over 12 years ago, when former Defense Comptroller Wilfred J. McNeil was about to move into the Pentagon as the Defense Department's first keeper-of-the-money, he and Loftis were discussing the newly formed Department.

To Loftis, who until then had spent some thirteen years largely on the fiscal operation of government, McNeil's ideas on how defense operation should be managed were "completely new, somewhat radical but intriguing."

Outlining to Loftis Secretary Forrestal's concept of his job, his relationship to the Services, and what it would mean to the establishment of administrative relations, McNeil asked, "Do you think you can do the job?"

Loftis' reaction: These new ideas were not the traditional way of doing things, but "they sound reasonable and I'll give it a try." He has been connected with the defense administrative operation ever since.

Today, Loftis and his staff work primarily with the civilian side of the military operation, must have a considerable knowledge of the concepts and plans behind each new organizational setup in Defense in order to provide proper and effective administrative support. Loftis has, in fact, spent as much of his time studying the various aspects of the Joint Agency problem, for instance, as he has in working on actual administrative services for OSD. "In twelve years of reorganization," says Loftis, "probably the stickiest problem I have seen has been setting up the appropriate administrative relationship of groups organized to perform a job for all of the Services, i.e. the Joint Agency problem."

Along this same line he feels that the next logical extension of the 1958 Reorganization is to alter the administrative setup to accommodate the emphasis on joint organizations. "If reorganization means anything at all, these people who have moved out from under a particular service, are now working for the total Department of Defense. For instance the Armed Forces Supply Support Center does not work for the Air Force. Yet the employees are carried on Air Force records because Air Force provides the administrative support."

This usually leads him into discussing a management theory of which today he is one of the few practitioners. It was first voiced by Forrestal when he came into the Pentagon. Forrestal said then that he intended to utilize existing facilities of the military departments to the maximum practicable extent in lieu of duplicating such facilities in his own office.

Furthermore, the job can be done without specific delegation of authority from the Secretary of Defense in each instance. In other words any designated contracting officer can execute contracts for the Secretary of Defense, any designated travel officer can authorize travel for Secretary of Defense personnel and any civilian personnel officer can appoint, and administer oaths to civilian personnel for the Secretary of Defense.

This idea, although clean, effective and simple as handled by Loftis, has had an uphill fight getting any kind of favorable reception elsewhere. But for Loftis, it has helped to cut his own staff from some 250 people in 1952 down to 110 today, even though there are more jobs to be done.

Examples: Navy does the OSD payroll, has been told by Loftis, who provides the basic information, "We're not interested in how you do the job, just in the results."

In this connection, back before a concept called direct citation of funds was put into operation, outfits which did work for other agencies within Defense would be reimbursed for funds they spent, a process so cumbersome that frequently an agency did a job for free (if its budget could carry it) told the requesting service to never mind the money, it was too tough trying to get it back.

Under direct citation of funds, Army for instance may buy a desk for Secretary Gates, will disburse the funds themselves, but use an OSD appropriation number.

But Loftis has moved slowly in selling his arguments for greater efficiency to the rest of the Pentagon. He uses unified command analogy. "First, we have to set a pattern here. When we do, the others will fall in place. It's been happening that way ever since Defense was organized. But one of the things of which we must be very careful is the long range direction these day to day decisions are taking us. If we aren't careful, we may wake up one day to find that we have created a fourth department—something we don't want—and unless we keep looking far down the road, it will happen without our even realizing it."

Bob Loftis had a hard time convincing himself he was going to become a career government employee. Born in Salt Lake City, Utah in 1912, he graduated from the University of Utah in 1933, moved to Washington, D. C. to attend George Washington University, graduated in 1937 with a law degree and was admitted to the District of Columbia bar the same year.

Up to his Army service in World War II, and even afterwards, he still hadn't decided to make government a career, still found it hard to move into the law business because he was high enough up in government that he couldn't switch without a swat in the pocketbook.

When he moved into the Pentagon, however, his whole outlook changed. In Loftis' words, "The job is so challenging, offers so many rewards, a feeling of contributing something important, compared to other government agency jobs, that really there is no comparison."

Loftis describes his job today as "exercising no authority, having no mission except to perform a staff service, seeing that what the Secretary wants done is done.

"But we don't misuse his name. Although our life span would probably be short we could behave like real tyrants, sitting as we do in the Secretary's shadow. We prefer to work with other Pentagon agencies, letting them know what the Sec/Def wants done in their areas. I feel it's important to our success, that we don't operate on a directive basis."

Certain he has a long way to go in perfecting the use of this "delegation," he nonetheless feels it must come if the Pentagon is to improve the efficiency of operation and ease paperwork. "It is important to the people involved," says Loftis, "and important to full realization of the 1958 Reorganization."

The Second of Fourteen Erroneous Postulates

There are two classes of people in an organization: one class capable of doing the thinking and giving orders, and another class capable only of taking orders and carrying them out.

by Leland B. Kuhre,
Col., USA (ret.)*
Founder and Director
The Academy of Organizational Science

Collective human effort includes all types: executive and administrative, professional and scientific, technical and clerical, artisan and unskilled.

A true organization functions as a system in accomplishing its definite purpose without waste of time and energy.

Postulates start and sustain logical deduction or intuitive reasoning; they permeate results. Age, repetition, and prestige-utterance implant generalizations with a religious fixity; then, generally in unawareness, they have the weight of postulates.

An example of both age and prestige-utterance of the above generalization is from Aristotle in a slave society: "There are two classes of persons and the one is an inferior to the other as the body is to the soul or a beast to a man . . . [and] . . . is only so far a rational human being as to understand reason without himself possessing it."

Repetition is common: "You're not paid to think, you're paid to do what you're told." When I was at West Point it was common for upperclassmen to reprimand a plebe: "You don't think, mister, because when you do you tie it up."

Demonstration—This nation was founded on the declared-to-be-immutable truth that every man had powers of thought and reason. The Declaration of Independence recognized these inherent powers in all men for every facet of their lives—political, religious, social, and economic. However, the postulate under discussion views men as robots and thus depreciates them below their true value.

The postulate is *in* the words and actions emanating from it; these convey an attitude. The attitude causes a reaction passive, routine compliance. Thus many minds are lost to the organization. These lost minds are in contact with the tangibles in their work and in the work of others.

But why should a person who is not supposed to be able to think try to do something about inefficiencies he sees? He says to himself: "The thinkers are responsible; these things are in their bailiwick, not mine. Why should I risk going out of my way to criticize or show up somebody and maybe end up in the doghouse?"

The extent of the loss has been belatedly recognized by post World War II emphasis on suggestion systems. These systems try to stimulate *all* minds in the organization by rewarding useable ideas from everyone, in both "classes". But such systems are superficial contradictions when basic organizational attitudes come from the two-class postulate.

Summary—The elements of demonstration have shown: 1) the postulate is inconsistent because it contradicts a held-to-be-immutable truth about the inherent value of the individual as a thinking human being; and 2) its effect is inconsistent with true organization because it loses the minds of men with a resulting loss in total efficiency.

Conclusion—Therefore the postulate is erroneous as a starting assumption from which to create or sustain a true organization of collective human effort.

Rational postulates must include three concepts: 1) the source of organizational power is each individual mind with its inherent powers of thought, reason, and creativeness; 2) generating a system of relations finds, orders, and connects unique individual 'contracts' so that the system invites, guides, and coordinates maximum continuing contribution from each contract as appropriate to and from within its boundaries in the system; and 3) the power in each mind is activated by having within it a fundamental and continuing contract appropriate to it.

*Author Kuhre can be contacted at 203 Greenlawn Dr., San Antonio, Tex.

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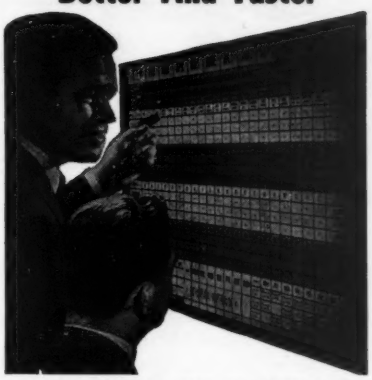

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Newsletter

Armed Forces Management Association
Washington 25, D.C. Phone: OTis 4-7193

National President: Hon. George H. Roderick **Exec. Vice Pres.: VAdm. Harry E. Sears, USN, ret.**

Board of Directors Meet

The quarterly meeting of the National Board of Directors of the Association met in Washington on February 10th. Presided over by AFMA President, George H. Roderick, a thorough review of all aspects of the Association's operation were made by the national officers in attendance. Highlights: Despite extraordinary expenses occasioned by our expanded program, fiscal condition remains excellent, and a balanced budget for the year appears probable. Membership continues to grow—it has doubled in a little over a year. Three new chapters were chartered during the period; requests for chartering information from wide-spread commands and activities now number 30. Planning for the '60 Conference is proceeding on schedule, as outlined in February Newsletter. The fifth and final section of the Chapter Manual—Part III, "Developing a Chapter Program," has been completed and is being mailed to all chapters, and new chapter sponsors. Proposed revisions in the National Constitution to bring it into line with our new organization and expanded program were discussed. A slate of board members to replace those whose terms expire at the end of AFMA fiscal year, 31 May, was introduced. Constitutional revisions and the slate of new officers will be referred to the Membership for approval as required by Constitution.

Membership Promotion

One area of our operation which the Board of Directors felt is susceptible to improvement is membership growth. Our principal source of revenue, a more rapid growth in membership would allow a more rapid introduction of new services to the various member categories. Here is what can be done to help: If a commanding general or flag officer, a commanding officer, or a civilian executive in a position of authority, your interest and support of the objectives and program of the Armed Forces Management Association would be greatly appreciated. Officials who have lent their active support to the AFMA movement, such as CG's of 3rd and 5th U.S. Armies, Commandant, 9th Naval District, CG's SAC and AMC, and Commander Norfolk Naval Shipyard—to name but a random few—have been rewarded by increased management mindedness and management improvement consciousness on the part of their personnel, and enhancement of the command's mission accomplishment and public relations efforts. For those commanders who are not too familiar with AFMA, we would point out that the Association's purpose and program repeatedly have been endorsed by the Secretary of Defense and the Service Secretaries, and their uniformed chiefs. They and we feel that membership in AFMA is good for the individual, his outfit and our national defense effort. Where a number of members in an area have grouped together in a chapter, the effectiveness of membership is multiplied considerably. So, lend us your support, if you will, and we in turn will do everything we can to assist in the development of meaningful and valuable programs for your AFMA members and chapters.

Members can help, too. If each member will but sign up one new member, our membership will again double this year. Application forms are available at your chapter, or, merely send in the prospect's name to National Headquarters. (Address as per letterhead) Support your local chapter activities.

Chapter Briefs

Wright Brothers Chapter at Wright-Patterson AFB was the host to AFMA President, Honorable George H. Roderick, and the Association's Executive Vice President, Admiral Sears, at a dinner meeting on 12 January held jointly with the Dayton Chapter of the Air Force Association. At this meeting, Colonel Norman Armour, who is leaving the area, was received as president of the AFMA group by Mr. Dwight H. Kemp. Principal points of Secretary Roderick's address was the constant need for management improvement in the defense establishment, and the important role which the Armed Forces Management Association plays in complementing DOD programs directed to this objective.

SACOMA Chapter, our newest chapter located at SAC Headquarters, Offutt AFB, at a meeting held on 5 February elected chapter officers as follows: President—Colonel Richard L. Temple; Executive Vice President—Colonel Byron K. Enyart; VP Membership—Major Edmund L. Fortin; VP Programs—Lt. Colonel Louis A. Delaney; Secretary—Lt. Colonel John M. Sturat, Jr.; Treasurer—Major Earl N. Peronto.

Great Lakes—Chicago Chapter continued its excellent program with a dinner meeting and panel discussion on 16 February at Fort Sheridan. Speaking to "Management Looks to the Future," were The Honorable Carl A. Shroeder, Postmaster Chicago; Captain C. K. Phillips, USN, C. O. U.S. Navy Supply Depot; A. Richard Chase, Johnson & Johnson Co., Chicago; I. M. Lieberman, President Industrial Relations Association, Chicago. Correction: November meeting heard Col. Donald M. Wright,—not Col. A. L. Selby, as earlier reported.

Great Salt Lake Chapter had as its principal speaker at a recent meeting Captain C. F. Palmer, SC USN, C.O. Naval Supply Depot, Clearfield. This Utah group is an integrated chapter with membership from Army, Navy and Air Force installations in the area. Ray L. Davis, NSD, is president. President elect is Russell Stephenson, Ogden Air Material Area, Hill AFB.

National Capital Chapter conducted a panel presentation on 16 February in the Pentagon, chaired by Leon Burnham, Office Comptroller of the Army. Panel members consisted of James P. Carroll, Air Force M. & O., William B. Rice, Navy Management Office, and Preston Wright, Office of the Quartermaster, Army. Tom Kouzes is chapter president.

Gosport Chapter, Norfolk Naval Shipyard, elected the following to office for the coming year: President C. Baxter Spencer; VP, Edwin G. Kintner, Jr.; Secretary-Treasurer, Edgar C. Hickisch; Councilmen, Rear Admiral William H. Leahy, USN, shipyard commander, and Edwin C. Wright, Jr.

HOW RISKY ARE COMMON STOCKS?

Every once in a while some thoughtful bloke who has developed an interest in the investment process gets to pondering a basic question. He wonders whether stocks are risky.

Well, they are and they aren't. There have been times in America's history when business was so bad that a great many companies lost money instead of earning it. Even in ordinary times, some companies lose money because their products are no longer needed, or because their management has not kept up with the latest technological and marketing advances, or for many other reasons. This is a hazard that is all part and parcel of the American system of free enterprise. Every businessman knows he must take a chance that his company may drop by the wayside.

Over the years some corporations prosper and grow, a situation that causes joy among stockholders. For example, an investor who purchased one share of IBM at $48 in 1915 would now have 67 shares valued at over $30,000. On the other hand some corporations go bankrupt and disappear. One looks in vain at today's stock tables for such onetime favorites as Auburn Motors and Pierce Arrow.

By and large the record of the corporations listed on the New York Stock Exchange has been very good on the long-term basis. There are over 525 listed common stocks which have paid a cash dividend in every one of the last 20 years. Nobody should ever buy a stock, however, without being fully and frankly aware that while he stands to gain, he is also taking a risk.

In actual fact, of course, any investment involves risk. A favorite investment of many Americans has been real estate. Since the nation has grown so fast, it has often been a good investment. But even in the midst of the most rapidly growing cities there have always been neighborhoods which were going out of fashion and where property values went down.

Even keeping money in the bank—or for that matter in a mattress—involves risk. The value of money goes up and down too. The man who puts a dollar aside today has no assurance as to how much that dollar will buy when he decides to spend it later on. Indeed in the last eighteen years the value of the dollar, as measured by what it could buy, declined from 100 cents in 1940 to 48 cents in 1958. This was probably the sharpest decline in our history and may never be repeated—but it does show that even owning money can at times be risky.

Quite a few stocks are classified by brokers and other sophisticated investors as "speculative," by virtue of the company's currently uncertain prospects for the future—as compared with more stable enterprises. Some companies such as new mining or oil companies are speculative because they may strike ore or oil and may not. Other companies are speculative because they are in a new and rapidly changing industry like some branches of electronics, where the future cannot yet be foreseen.

The man who buys a speculative stock takes a greater than average risk. There is often a chance that his stock may not return any dividends for a long time. Its market price may decline sharply or the company may even go out of business.

If the company succeeds, however, the man who holds its stock will often make a considerably higher than average profit. This is simply a standard rule of the business world: the greater the risks taken, the greater usually are the rewards for success.

There is nothing wrong with buying speculative stocks provided you are in a position to speculate and do so with your eyes open. But you should certainly concentrate on the shares of established, prosperous companies if you want to keep the risks of investment to a minimum.

In the early days of the electrical industry, General Electric was a speculative stock. General Motors was also once a speculative stock, and so was Standard Oil of New Jersey. These are the successes—and naturally there have also been many speculative companies which have long since gone out of business.

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In My Opinion...

continued from page 6

"their brains bolted together by their own incompetence" serves no useful purpose.

It is strongly recommended that the Editor read more of the Congressional hearings before breaking his lance on the windmills. The hearings before the Congressional committees have done much to focus attention on areas which needed clearing up . . .

It is my privilege to know several members of the House and Senate and their staffs. While working for the USAF in the Pentagon and with other government agencies in Washington I furnished information to such Congressional Committees. I found them to be dedicated, sincere, hard-working and loyal citizens of the United States. Their interest is that we have the best possible defense that can be bought with available dollars. Repeated instances of poor judgement by Defense planners, uncertainty as to needs, and failure to fully utilize available resources has created the fertile field for Congressional inquiry. It seems to me that we need to clean up our House before we point at someone else.

Instead of fighting Congress why not try working with them in understanding and harmony so we can get the maximum benefit. I am sure that your editorial will be repudiated by the thinking personnel in the Department of Defense. I strongly urge that you apologize to Congress for this unjustified attack upon their ability and integrity.

Cecil W. Barnes

San Antonio, Tex.

It was, in fact, thorough persual of Congressional hearings which prompted the Editorial in question. We might strongly suggest a more careful reading of the Editorial is in order. This, we think, will show something other than the blanket indictment that is implied above. While it is easy to deal in terms of "Black and White," or "Good and Bad," it is seldom accurate, and frequently a mark of naivete.—Ed.

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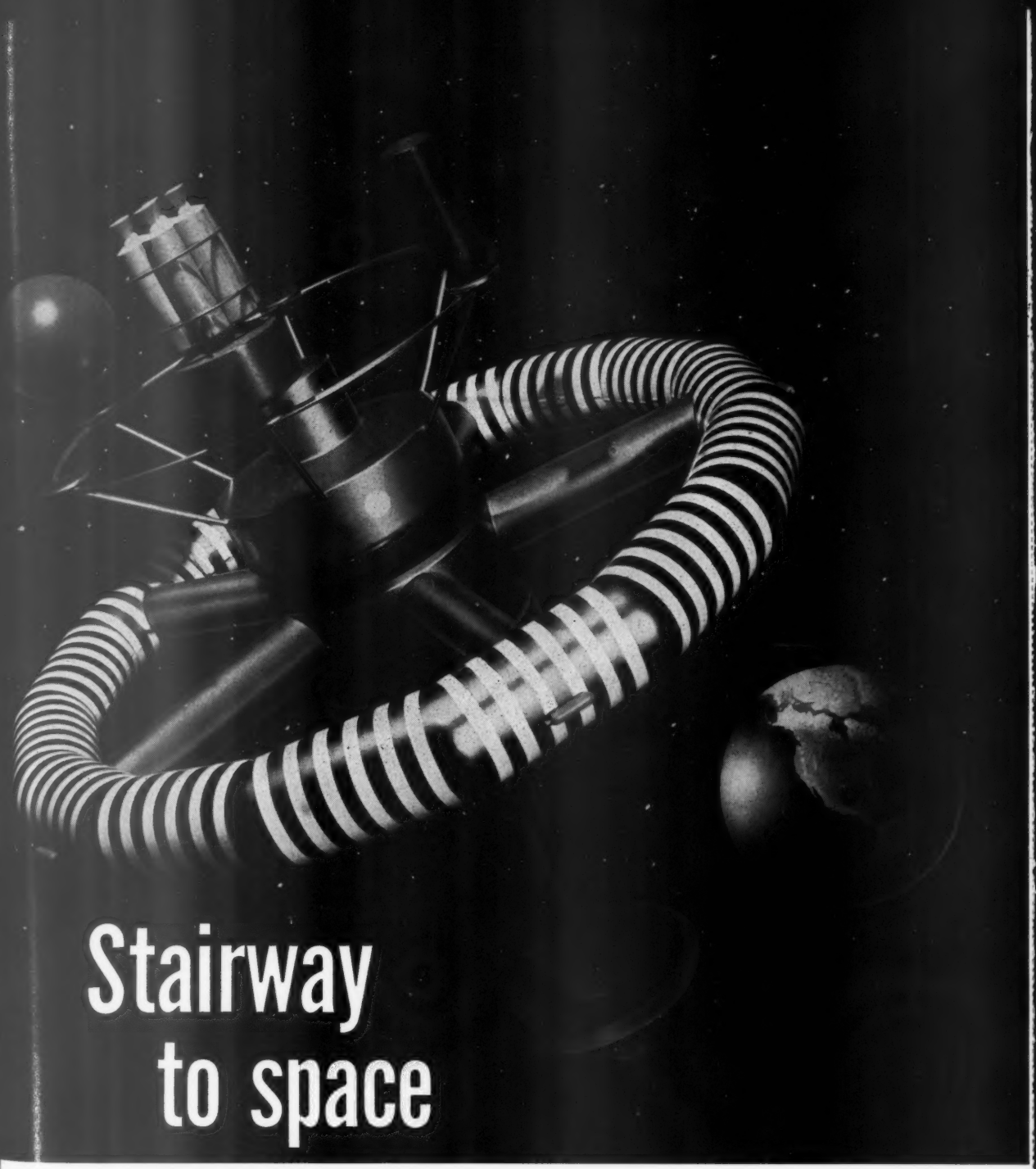

Stairway to space

Sometime in the 60's, America may have a manned station in space—and it could look a lot like this scale model by Lockheed.

We have much to learn before it can be built. Research is our stairway to space—basic research that seeks to discover the new rather than develop the known. We cannot predict what such research will discover, or when—but we delay it or curtail it at our peril.

Today, at Lockheed's Missiles and Space Division, more than 5,000 scientists and engineers are engaged in one of U.S. industry's broadest research and development programs. One group is conducting private industry's largest, most diversified program of fundamental research in space physics. Already they have made massive contributions to America's space technology—particularly in the Discoverer, MIDAS, and Samos satellite programs of the U. S. Air Force.

LOCKHEED MISSILES & SPACE DIVISION

Sunnyvale, California

Multi-Use Automated Maintenance

MPTE

The recent demonstration of multi-purpose test equipment (MPTE), developed by RCA under a series of Army Ordnance contracts, highlights *a new dimension in automated multi-use systems support* and culminates a long-term RCA effort in this field. This General Evaluation Equipment is an automated, transistorized, dynamic checkout system. It contains a completely modularized array of electronic and mechanical evaluation equipment, capable of checking a variety of electromechanical devices, ranging from radar subassemblies to missile guidance computers. MPTE provides the stimuli, programming, control, measurement and test functions for the NIKE AJAX, NIKE HERCULES, LACROSSE, HAWK and CORPORAL missile systems and has been extended to other weapons systems related to our defense efforts.

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